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MON 20/20

Software for Gas Chromatographs

Applies to all Emerson XA Series Gas Chromatographs

ROSEMOUNT® Analytical

EMERSON™ Process Management

MON 20/20 Software for Gas Chromatographs User Manual

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IMPORTANT INSTRUCTIONS

- Read all instructions prior to installing, operating, and servicing this product.
- Follow all warnings, cautions, and instructions marked on and supplied with this product.
- Inspect the equipment packing case and if damage exists, notify your local carrier for liability.
- Open the packing list and carefully remove equipment and spare or replacement parts from the case. Inspect all equipment for damage and missing parts.
- If items are damaged or missing, contact the manufacturer at 1 (713) 827-6314 for instructions about receiving replacement parts.
- Install equipment as specified per the installation instructions and per applicable local and national codes. All connections shall be made to proper electrical and pressure sources.
- Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent personal injury.
- Use of this product for any purpose other than its intended purpose may result in property damage and/or serious injury or death.
- Before opening the flameproof enclosure in a flammable atmosphere, the electrical circuits must be interrupted.
- Repairs must be performed using only authorized replacement parts as specified by the manufacturer. Use of unauthorized parts can affect the product's performance and place the safe operation of the product at risk.
- When installing or servicing ATEX-certified units, the ATEX approval applies only to equipment without cable glands. When mounting the flameproof enclosures in a hazardous area, only flameproof cable glands certified to IEC 60079-1 must be used.
- Technical assistance is available <u>24 hours a day, 7 days a week</u> by calling 1 (713) 827-6314.

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Section 1: Getting started

Welcome to MON 20/20—a menu-driven, Windows-based software program designed to remotely operate and monitor the Daniel® Danalyzer™ XA series and the Rosemount® Analytical XA series of gas chromatographs.

MON 20/20 operates on an IBM-compatible personal computer (PC) running the Windows XP operating system or later.

MON 20/20 can initiate or control the following gas chromatograph (GC) functions:

- Alarm parameters
- Alarm and event processing
- Analog scale adjustments
- Analyses
- Baseline runs
- Calculation assignments and configurations
- Calibrations
- Component assignments and configurations
- Diagnostics
- Event sequences
- Halt operations
- Stream assignments and sequences
- Valve activations
- Timing adjustments

MON 20/20 can generate the following reports:

- 24-Hour Averages
- Analysis (GPA)
- Analysis (ISO)
- Calibration
- Final Calibration
- Validation
- Final Validation
- Hourly Averages
- Monthly Averages
- GC Configuration
- Raw Data
- Variable Averages
- Weekly Averages
- Dew Temperature Calculation (optional)

MON 20/20 can access and display the following GC-generated logs:

- Alarm Log
- Event Log
- Parameter List
- Maintenance Log

1.1 What's new in MON 20/20

Users familiar with MON2000 or MON2000 Plus will find a few changes when using MON 20/20:

- Login security is at the gas chromatograph level instead of at the software level. This means that you no longer have to log in after starting MON 20/20—but you do have to log in to the gas chromatograph to which you are trying to connect. For more information, see "Connecting to a gas chromatograph" on page 1-25.
- An "administrator" role has been added to the list of user roles. This new role has the highest level of authority and is the only role that can create or delete all other roles. For more information, see "Managing users" on page 7-17.
- Multiple users can connect to the same gas chromatograph simultaneously. By default, the first user to log in to the GC with "supervisor" authority will have read/write access; all other users, including other supervisor-level users, will have read access only. This configuration can be changed so that all supervisor-level users have read/write access regardless of who logs in first. For more information, see "Managing the system" on page 4-2.
- Users can display multiple windows within MON 20/20.
- Automatic reconnection. If MON 20/20 loses its connection with the GC, it automatically attempts to reconnect.
- Users can view multiple instances of certain windows. To aid in data processing or troubleshooting, MON 20/20 is capable of displaying more than one instance of certain data-heavy windows such as the Chromatogram Viewer and the Trend Data window.

- Enhanced Chromatogram Viewer. The following enhancements have been made to the Chromatogram Viwer:
  - Users can view an unlimited number of chromatograms, in any configuration. For example, a user can view an archived chromatogram and a live chromatogram. For more information, see "Viewing chromatograms" on page 2-1.
  - The "Keep Last CGM" option. Upon starting a new run, MON 20/20 can keep the most recently completed chromatogram on the graph for reference.
  - Overview window. When zoomed in to a smaller section of a chromatogram, the user can open a miniature 'overview' window that displays the entire chromatogram, for reference. For more information, see "Additional plot commands" on page 2-19.
  - Older chromatograms available. MON 20/20 has access to archived chromatograms as old as four or five days. For more information, see "Viewing an archived chromatogram" on page 2-5.
  - Full screen mode. For more information, see "Working with the graph" on page 2-15.
  - Protected chromatograms. Chromatograms that you designate as "protected" will not be deleted. For more information, see "Protecting or unprotecting an archived chromatogram" on page 2-9.
- The "Invert Polarity "option. This feature reverses a device's effect. For more information, see "Inverting the polarity of a valve" on page 3-14 and "Inverting the polarity of a discrete input" on page 3-28.
- Streamlined variables-picking menu. The method for selecting variables for calculations and other purposes is contained within one simple, self-contained menu. For more information, see "Using the context-sensitive variable selector" on page 1-42.
- GC Time. The GC Status Bar displays the date and time based on the GC's physical location, which may be different than the PC's location. For more information, see "Setting the gas chromatograph's date and time" on page 2-40.
- Daylight savings time. You have option of enabling a GC's daylight savings time feature. Also, there are two options for setting the start and end times for daylight savings time on the GC. For more information, see "Adjusting daylight savings" on page 2-42.

- Baseline offsetting. In some situations that involve TCD detectors the baseline may be displayed either too high on the graph, in which case the tops of the peaks are cut off, or too low on the graph, so that the bases of the peaks are cut off. If this occurs it is possible to offset the baseline either up or down so that the entire peak can be displayed on the graph. This offset will be applied to all traces—live, archived and saved—that are displayed thereafter. For more information, see "Viewing raw data" on page 2-38.
- Microsoft Excel-based Parameter List. The Parameter List has been expanded to offer seven pages of information, and is Microsoft® Excel-based to allow for access outside of MON 20/20. The document can be imported to and exported from GCs. For more information, see "Working with the parameter list" on page 5-10.
- Optional Foundation Fieldbus variables. If your GC is installed with a Foundation Fieldbus, you can map up to 64 GC variables to monitor using the AMS Suite. For more information, see "Mapping Foundation Fieldbus variables" on page 4-98.
- Optional local operator interface (LOI) variables. If your GC is installed with an LOI, you can configure up to 25 GC parameters to monitor using the LOI's *Display* mode. For more information, see "Working with local operator interface variables" on page 4-96.
- Access to GC-related drawings such as flow diagrams, assembly drawings, and electrical diagrams.
- Validation runs. During a validation run, the GC performs a test analysis to verify that it is working properly. For more information, see "Managing Validation Data Tables" on page 4-35 and "Validating the Gas Chromatograph" on page 6-7.

1.2 Getting started with MON 20/20

This section covers such issues as installing, registering and setting up the software, as well as configuring MON 20/20 to meet your specific needs.

1.2.1 System requirements

To achieve maximum performance when running MON 20/20, ensure your PC meets the following specifications:

- Software
  - Windows® XP (Service Pack 2 or later), Windows® Vista, or Windows® 7.
  - Internet Explorer® 6.0 or later.
- Hardware
  - PC with a 400 MHz Pentium or higher processor.
  - 256 MB of RAM or higher.
  - 100 MB of free hard disk space. (An additional 280 MB is required on Windows® XP if .NET 2.0 is not previously installed.)
  - Super VGA monitor with 1024x768 or higher resolution.
  - For on-line operations, one serial port available for remote/local connection to gas chromatograph.
  - For on-line operations, one Ethernet port available for remote/local connection to gas chromatograph.
  - For remote connection only, a Windows®-compatible modem.
  - Windows®-compatible printer (optional)

1.2.2 Installing MON 20/20

You must install MON 20/20 from the Emerson Process Management MON 20/20 Software for Gas Chromatographs CD-ROM onto your hard drive; you cannot run the program from the CD-ROM.

Double-click the **Setup** file and follow the on-screen installation instructions.

Upon successful installation, MON 20/20 creates a shortcut icon on the computer's desktop.

Note
MON 20/20 is not an upgrade to MON2000; therefore, MON 20/20 should be installed to its own directory, separate from the MON2000 directory.

Note
You must be logged onto the computer as an administrator to install MON 20/20. Vista and Windows 7 users, even with administrator privileges, will be prompted by the operating system's User Account Control feature to allow or cancel the installation.

1.2.3 Launching MON 20/20

To launch MON 20/20, double-click its desktop icon or click the **Start** button and select *Emerson Process Management → MON 20/20*.

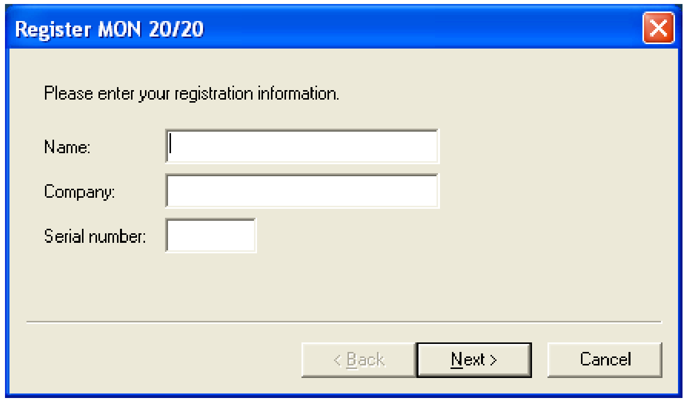
1.2.4 Registering MON 20/20

Each time you start MON 20/20 it will prompt you to register if you have not already done so. To delay or suspend this registration prompt, see Step 3.

Note
An active Internet connection is required to register.

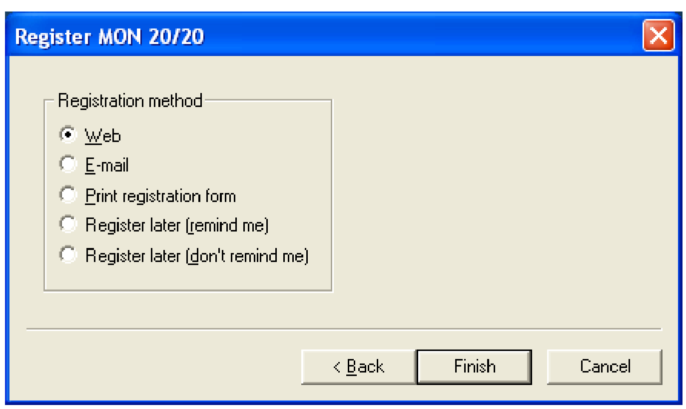
Registering your copy of MON 20/20 allows you to receive information about free updates and related products.

Figure 1-1. The Register MON 20/20 window, page 1



1. Enter your name, your company's name, and the serial number for your copy of MON 20/20 into the appropriate fields on the *Register MON 20/20* window.
2. Click **Next** to continue.
3. Choose the desired registration method by clicking the corresponding checkbox.

Figure 1-2. The Register MON 20/20 window, page 2



Note
To delay registration, check **Register later (remind me)**. MON 20/20 will display the *Register MON 20/20* window the next time you start the program. To prevent the *Register MON 20/20* window from displaying with each program startup—and without registering—check **Register later (don't remind me)**.

Note
You can register at any time by selecting **Register MON 20/20...** from the *Help* menu.

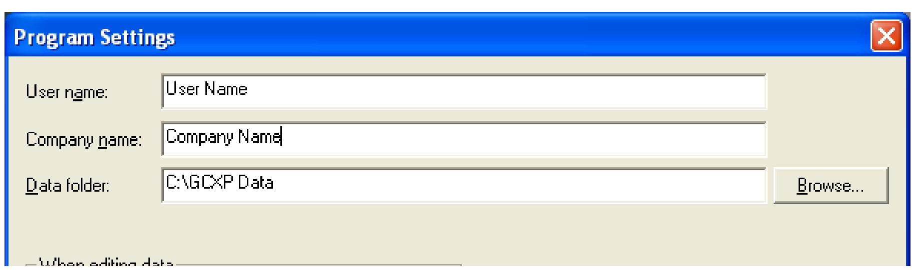
4. Click **Finish**.

1.2.5 Setting up the data folder

The data folder stores GC-specific files such as reports and chromatograms. The default location for the data folder is **C:\GCXP Data**. If you want MON 20/20 to store its data in a different location—on a network drive, for instance—do the following:

1. Move the **GCXP Data** folder to its new location.
2. Select **Program Settings...** from the **File** menu.
3. The current location of the data folder displays in the *Data Folder* field.

Figure 1-3. The Program Settings window



To change the data folder's location, click on the **Browse** button that is located to the right of the *Data Folder* field.

4. Use the *Browse for Folder* window to navigate to the **GCXP Data** folder's new location and click **OK**.

Note
Another method for changing the folder location is to type the folder's location into the *Data Folder* field and press ENTER. When the "Create the folder?" message appears, click **Yes**.

5. The *Data Folder* field updates to display the new location.

Figure 1-4. The Program Settings window

1.2.6 Configuring MON 20/20 to connect to a gas chromatograph

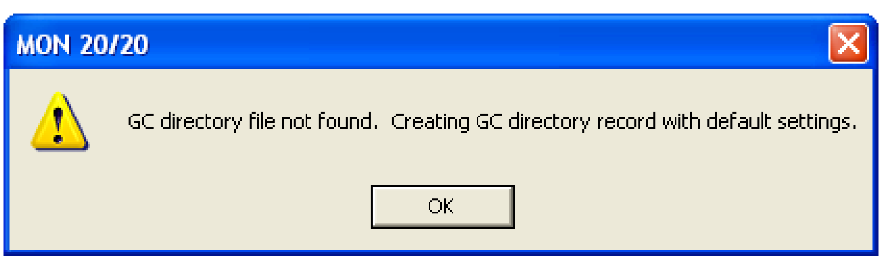
MON 20/20 can communicate via its Ethernet connection with any Ethernet-ready gas chromatograph.

To congifure MON 20/20 to connect to a GC, do the following:

1. Select **GC Directory...** from the **File** menu.

   If this is the first time that this option was selected, you will get the following error message:

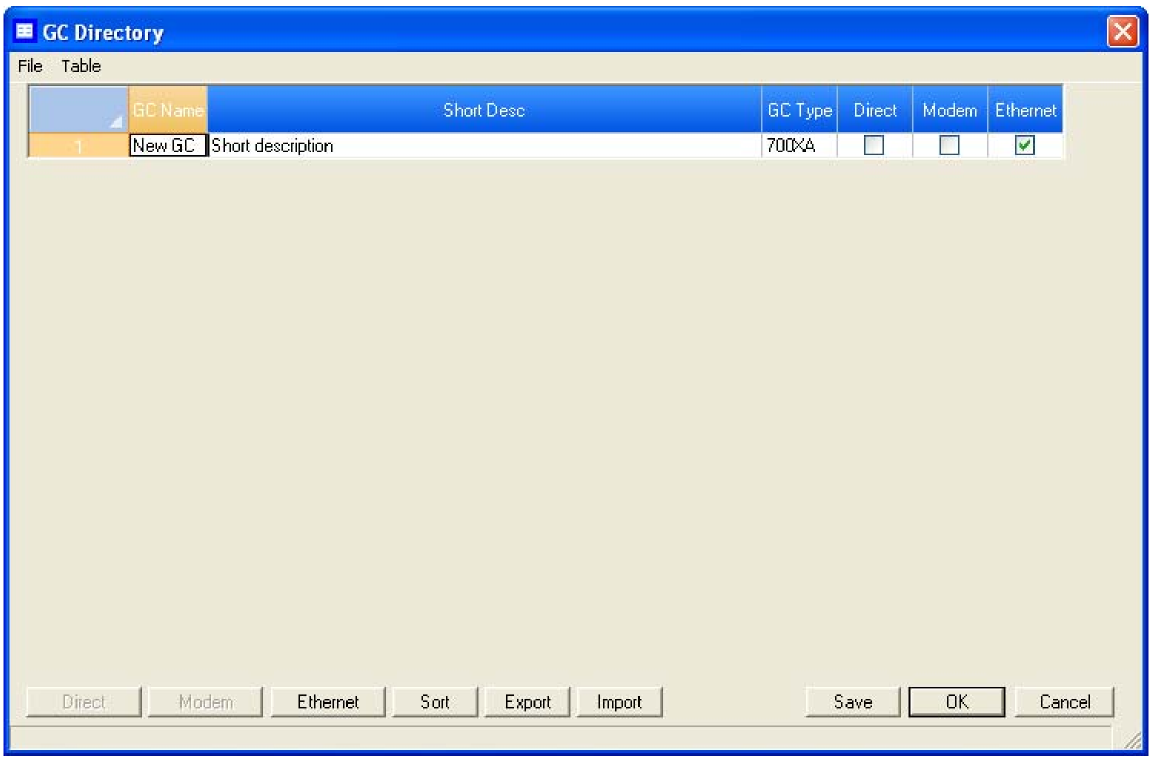
Figure 1-5. "GC directory file not found" message



If you get the "GC directory file not found" message, click **OK**. The *GC Directory* window appears and displays a table containing an inventory of the GCs to which MON 20/20 can connect.

2. If you are configuring the first GC connection for MON 20/20, there will be on one generic GC record listed in the window. To add another record, select **Add** from the *GC Directory* window's **File** menu. A new row will be added to the bottom of the table.

Figure 1-6. The GC directory window

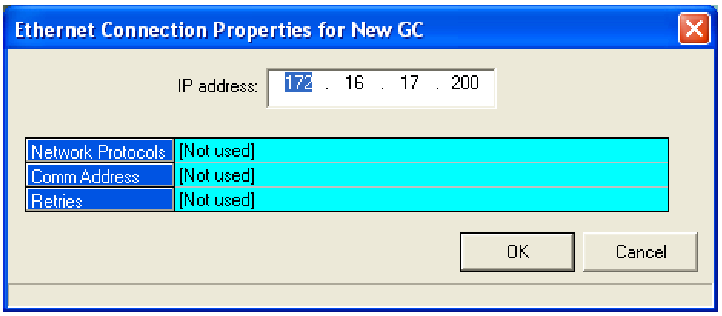


3. Click in the *GC Name* field and enter the name for the GC to which you want to connect.

4. Optionally, you can double-click in the *Short Desc* field and enter pertinent information about the GC to which you want to connect, such as its location. You can enter up to 100 characters in this field.

5. Select **Ethernet**. The *Ethernet Connection Properties for New GC* window appears.
6. In the *IP address* field, enter the IP address of the GC to which you want to connect.

Figure 1-7. The Ethernet Connection Properties for New GC window



Note
If you type in an invalid IP address, you will get an error message when MON 20/20 attempts to connect to the GC.

7. Click **OK**. When the **Save changes?** message appears, click **Yes**.
8. Repeat steps 2 through 7 for any other GCs to which you want to connect.
9. To delete a GC from the table, select the GC and then select **Delete** from the **File** menu.
10. To copy a GCs configuration information into a new row, select the GC and then select **Insert Duplicate** from the **File** menu.
11. To insert a row below a GC, select the GC and then select **Insert** from the **File** menu.
12. To sort the table alphebetically, select **Sort** from the **Table** menu or click **Sort** from the *GC Directory* window.
13. To copy the list of GCs to the clipboard to be pasted into another application, select **Copy Table to Clipboard** from the **Table** menu.
14. To print the list of GCs, select **Print Table...** from the **Table** menu.

15. To save the changes and keep the window open click **Save** from the *GC Directory* window. To save the changes and close the window, click **OK**. When the **Save changes?** message appears, click **Yes**.

For more details about configuring MON 20/20 connections, see "Configuring the gas chromatograph's Ethernet port" on page 4-95.

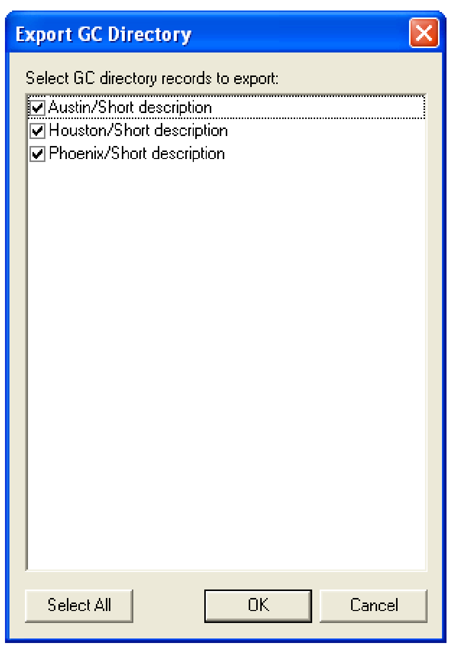
1.2.7 Importing or exporting the GC directory table

The *GC Directory* table, which contains the list of GCs that are currently configured for MON 20/20, can be saved as a DAT file to a PC or other storage media such as a compact disk or flash drive. This DAT file can be used to restored the GC directory information to the original application, or it can be used to quickly and easily configure other copies of MON 20/20 that are installed on other computers.

To save the *GC Directory* table to the PC, do the following:

1. Click **Export**. The *Export GC Directory* window displays.

Figure 1-8. The Export GC Directory



2. Select the checkbox for each gas chromatograph who information you want to save. If you want to save the entire list, click **Select All**.
3. Click **OK**. The *Export GC Directory File* save as dialog displays.
4. Choose a save location. The default location is **GCXP Data**.
5. The file is automatically given the name of **GC_DIRECTORY_EXPORT.DAT**. If you prefer a different name, type it into the *File name* field.
6. Click **Save**.

To import a GC Directory file, do the following:

1. Select **GC Directory...** from the **File** menu.

   If this is the first time that this option was selected, you will get the following error message:

Figure 1-9. "GC directory file not found" message

   If you get the "GC directory file not found" message, click **OK**. The *GC Directory* window appears

2. Click **Import**. The *Import GC Directory File* dialog displays.
3. Locate the GC directory file and select it. Click **Open**. The *GC Directory* window reappears with the list of newly configured GCs displayed in the *GC Directory* table.

1.2.8 Launching MON 20/20 from the SNAP-ON for DeltaV

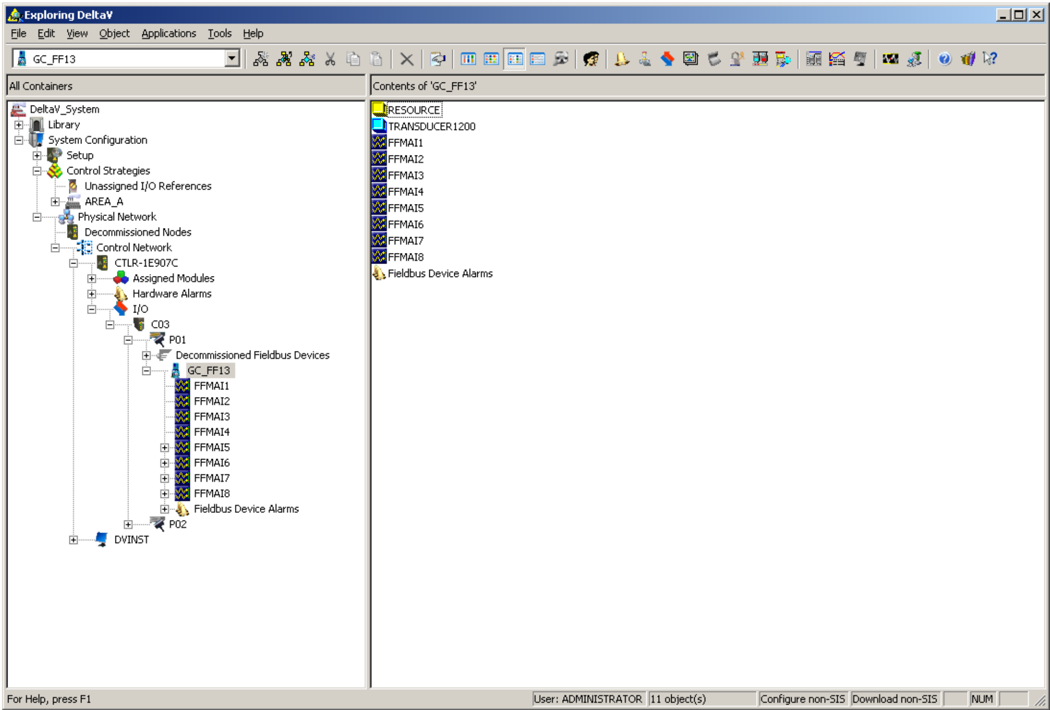
This section assumes that DeltaV is installed on the PC along with MON 20/20.

Note
To successfully use MON 20/20 SNAP-ON for DeltaV, you must be familiar with using the DeltaV digital automation system.

To start MON 20/20, do the following:

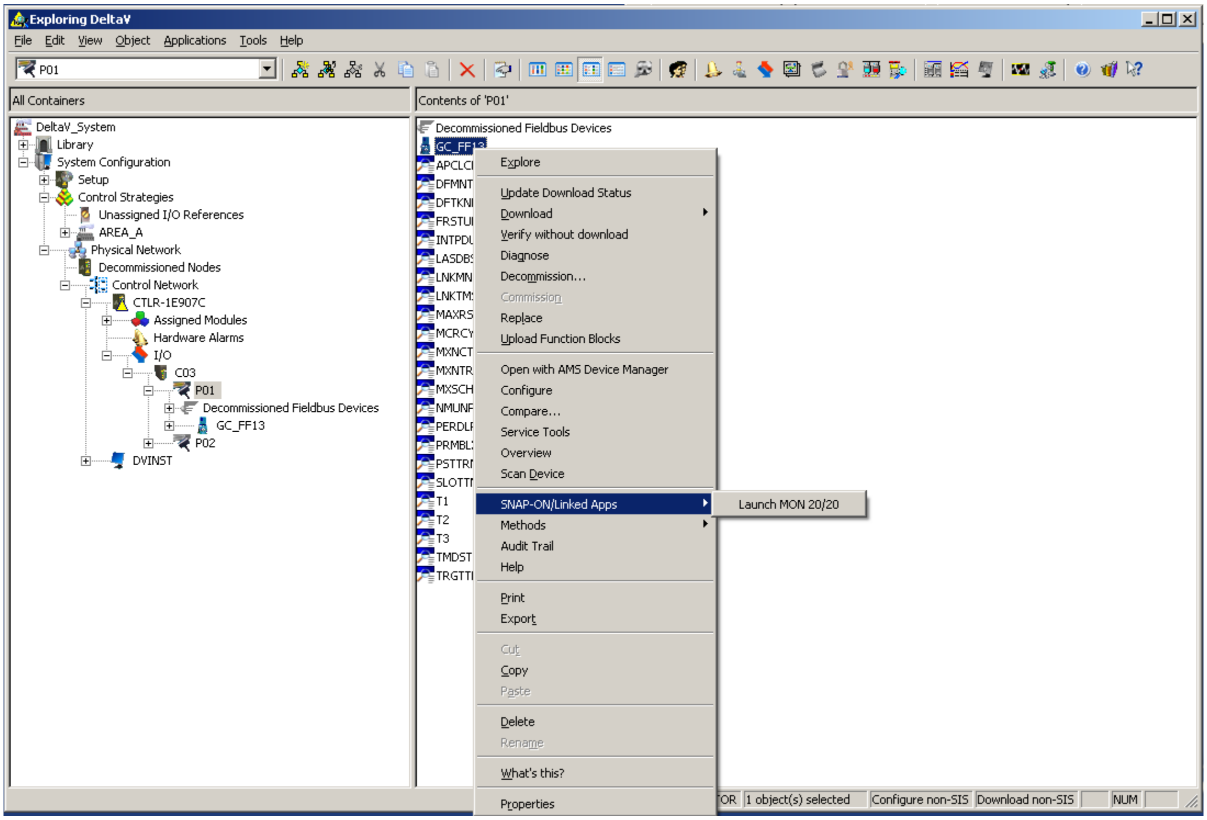
1. Start the DeltaV Explorer by clicking on its desktop icon or by clicking the **Start** button and selecting *DeltaV* → *Engineering* → *DeltaV Explorer*.
2. In the *Device Connection View*, open device icons by clicking once on each icon. Follow the path of connections until you locate the desired gas chromatograph icon.

Figure 1-10. The Device Connection View



3. Right-click on a connected gas chromatograph icon to display the context menu.

Figure 1-11. Right-click to view context menu



4. Select *SNAP-ON/Linked Apps* → *Launch MON 20/20*. MON 20/20 starts and connects automatically to the GC.

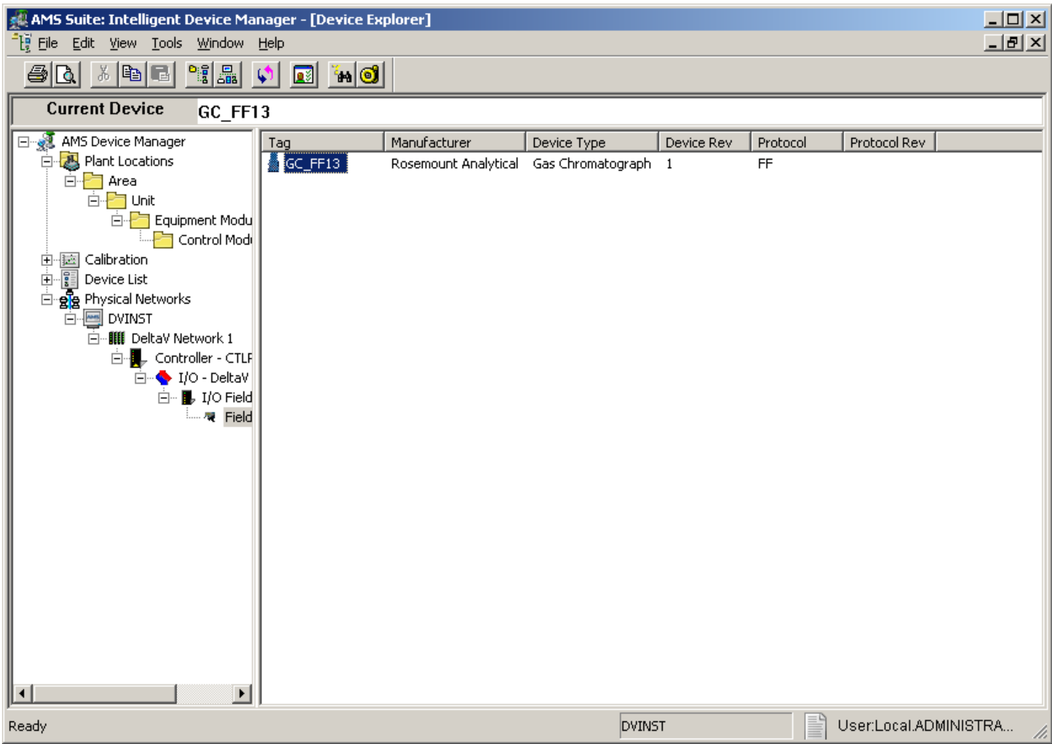
1.2.9 Launching MON 20/20 from the AMS Device Manager

This section assumes that DeltaV and AMS are installed on the PC along with MON 20/20.

To start MON 20/20, do the following:

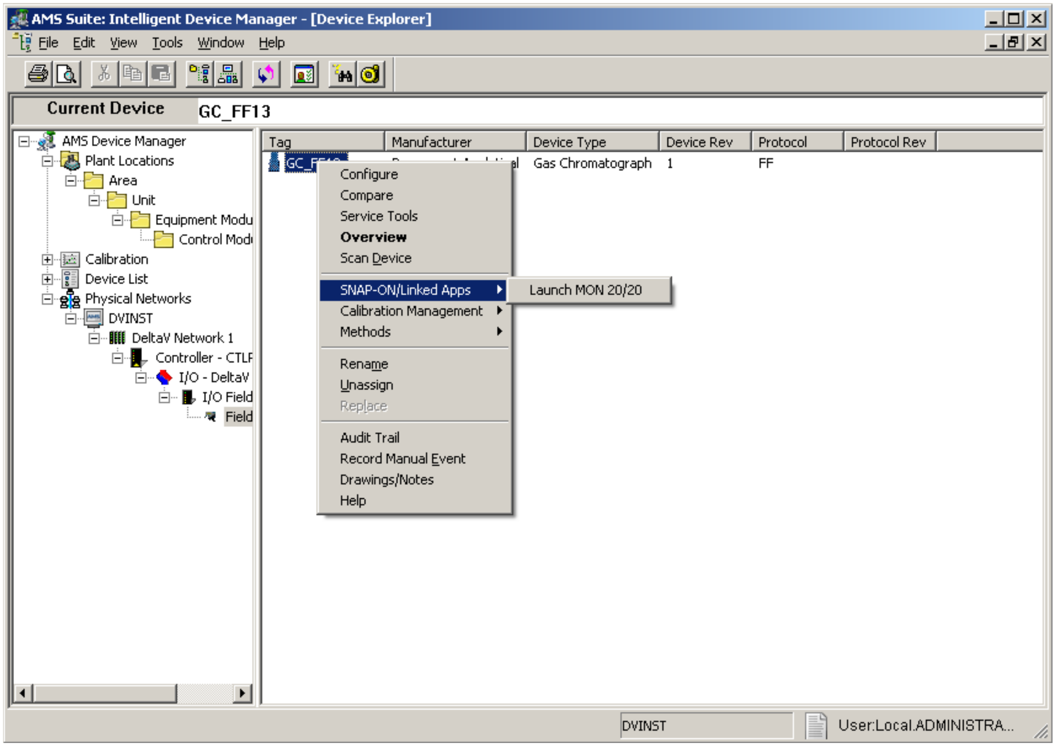
1. Start the AMS Device Manager by clicking on its desktop icon or by clicking the **Start** button and selecting *AMS Device Manager* → *AMS Device Manager*.

Figure 1-12. Device Explorer



2. In the *Device Connection View*, open device icons by clicking once on each icon. Follow the path of connections until you locate the desired gas chromatograph icon.
3. Right-click on a connected gas chromatograph icon to display the context menu.

Figure 1-13. Right-click to view the context menu

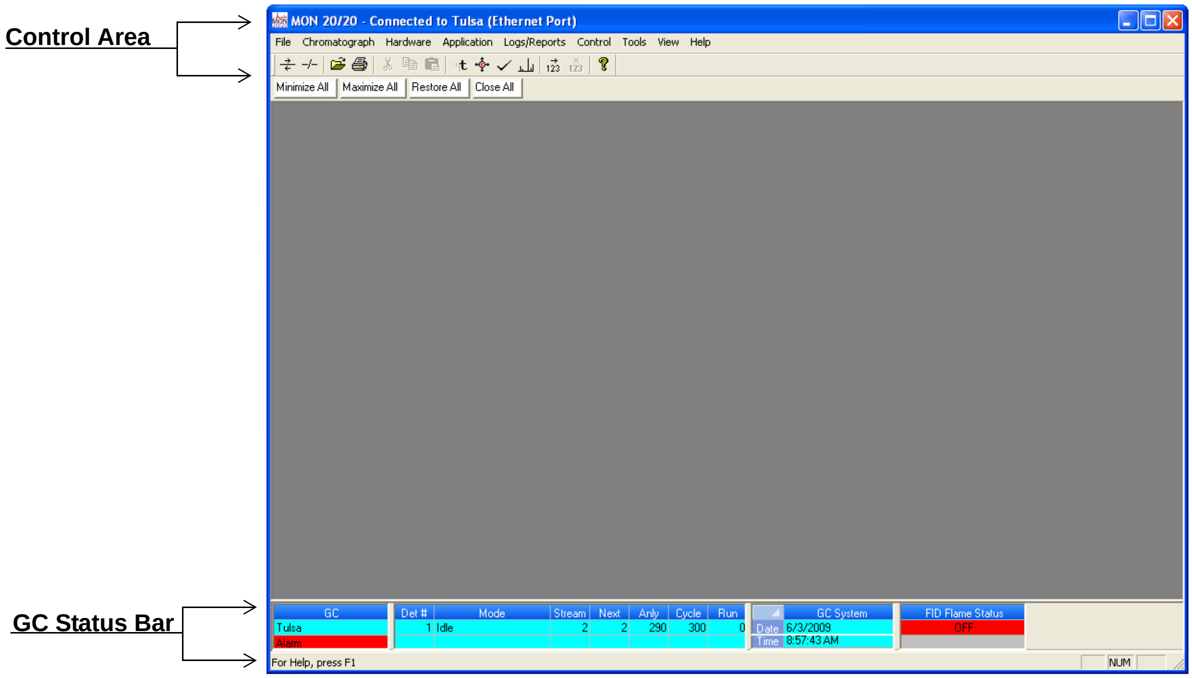


4. Select *SNAP-ON/Linked Apps* → *Launch MON 20/20*. MON 20/20 starts and connects automatically to the GC.

1.2.10 The MON 20/20 user interface

MON 20/20 has two areas of interaction: the Control Area, at the top of the program's main window, and the GC Status Bar, located at the bottom of the program's main window.

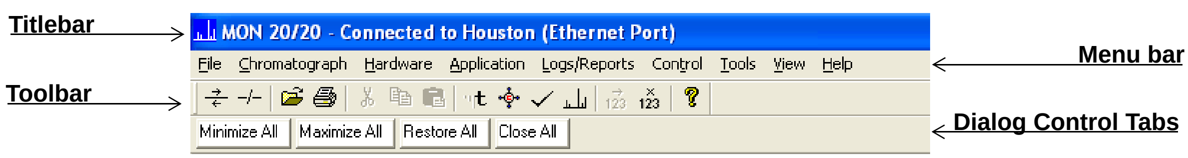
Figure 1-14. Features of the MON 20/20 main window



The main user interface

The main user interface of the main window contains the menus and icons that allow you to control MON 20/20 and the GC to which MON 20/20 is connected.

Figure 1-15. The Control Area



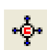
Titlebar - The Titlebar displays the name of the program, and well as the program's connection status. MON 20/20 has the following three overall status modes:

- Not connected - If MON 20/20 is not connected to a GC, then "MON 20/20" displays in the Titlebar.
- Connected - If MON 20/20 *is* connected to a GC, then "MON 20/20 - Connected to" and the name of the GC and the connection type displays in the Titlebar.
- Offline Edit - If MON 20/20 is in offline edit mode, then "MON 20/20 - Offline Edit <*filename*>" displays in the Titlebar.

• **Menu bar** - The Menu bar contains the commands that allow you to control and monitor gas chromatographs.

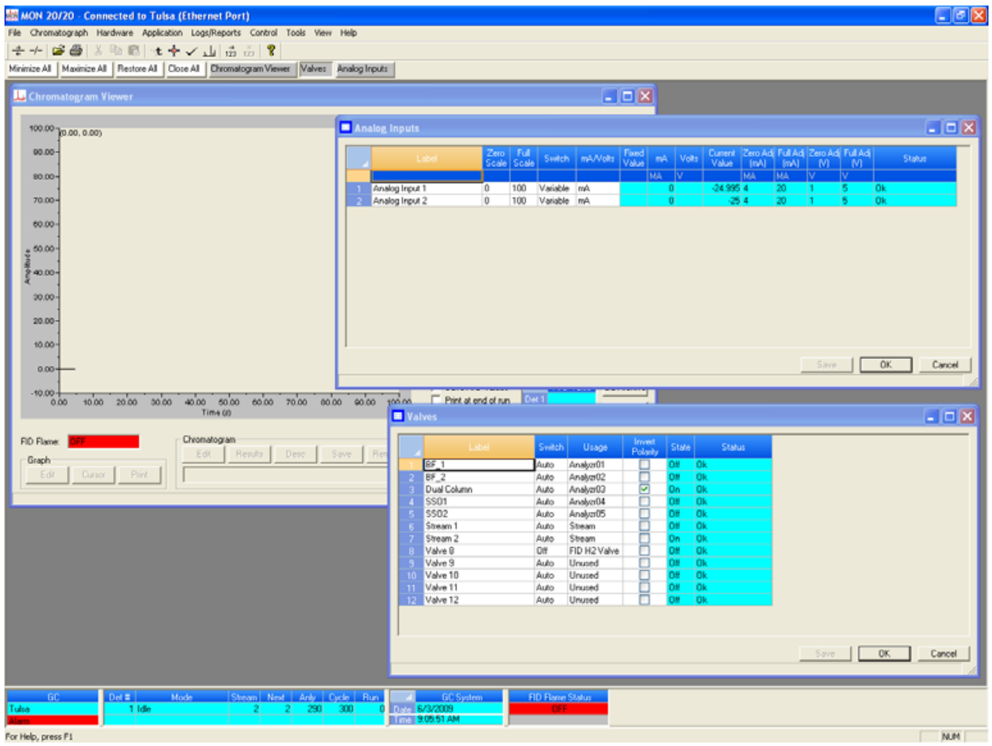
- **Toolbar** - The Toolbar contains shortcut icons for the most important and/or most often used MON 20/20 commands. From the Toolbar you can do such things as connect to and disconnect from a GC, view chromatographs, and view help files.

Table 1-1. Function of the shortcut icons on the Toolbar

	Connect to a gas chromatograph.
	Disconnect from a gas chromatograph.
	Open a configuration file.
	Print a GC configuration report.
	View the Timed Events window.
	View the Component Data window.
	Clear or acknowledge alarms.
	Open the CGM Viewer window.
	Begin auto sequencing.
	Halt auto sequencing.
	Open the About MON 20/20 window.

- **Dialog Control Tabs bar** - The Dialog Control Tabs bar contains four buttons that allow you to manage the behavior of all windows that are open in the main window. The four buttons are **Minimize All**, **Maximize All**, **Restore All**, and **Close All**.

Figure 1-16. The main window showing the function of the Dialog Control Tabs bar



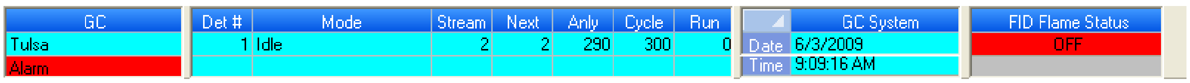
The bar also displays a button for each open window that allows you to select or deselect that window.

You can hide or display the Toolbar and the Dialog Control Tabs bar by clicking the appropriate option from the **View** menu.

The GC Status Bar

The GC Status Bar of the main window displays useful information about the status and functioning of the gas chromatograph to which MON 20/20 is connected.

Figure 1-17. The GC Status Bar



The GC Status Bar contains the following sections:

- **GC** - The first row displays the name of the GC to which MON 20/20 is connected. If MON 20/20 is not connected to a GC, “Not Connected” displays in this row. If MON 20/20 loses its connection to the GC, “Comm Fail” displays in this row, and the program will automatically try to reconnect. The second row displays status flags such as active alarms (with red background), unacknowledged alarms (with red background), or File Edit modes.
- **Det #** - Each row displays the identification number of the detector monitoring the alarm status of the connected GC. A GC can have a maximum of two detectors.
- **Mode** - Each row displays the mode of the appropriate detector. Potential modes are: Idle, Auto Cal, Auto Base, Auto Anly, FCal.
- **Stream** - Each row displays the current stream being analyzed by the appropriate detector.
- **Next** - Each row displays the next stream to be analyzed by the appropriate detector.
- **Anly** - Each row displays the analysis time for the appropriate stream.
- **Cycle** - Each row displays the total cycle time, in seconds, before the next analysis starts for the appropriate detector.
- **Run** - Each row displays the amount of time, in seconds, that has elapsed since the current cycle began for the appropriate detector.

- **GC System** - Displays the date and time according to the GC to which MON 20/20 is connected. The date and time displayed may be different from the user's date and time, depending on the physical location of the GC.
- **FID Flame Status** - Displays the status of the FID flame. Options are OFF with red background, ON with green background, and OVER TEMP with red background. The FID Flame Status indicator only displays on the GC Status Bar when the GC to which MON 20/20 is connected contains an FID detector.

You can hide or display the GC Status Bar by clicking **GC Status Bar** from the **View** menu.

1.2.11 Connecting to a gas chromatograph

To connect to a gas chromatograph, you must log on to it first. Most of MON 20/20's menus and options are inactive until you have logged on to a GC.

To connect to a GC, do the following:

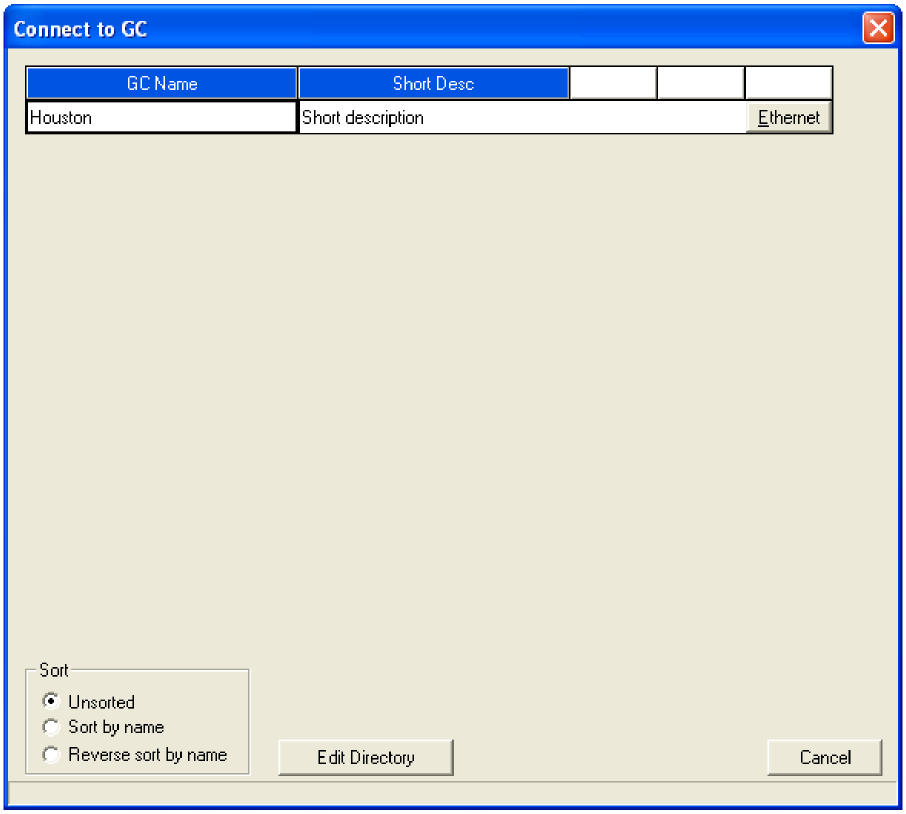
1. There are two ways to start the process:

   (a.) On the Toolbar, click  .

   (b.) Select **Connect...** from the **Chromatograph** menu.

2. The *Connect to GC* dialog, which displays a list of all the GCs to which you can connect, appears.

Figure 1-18. The Connect to GC window

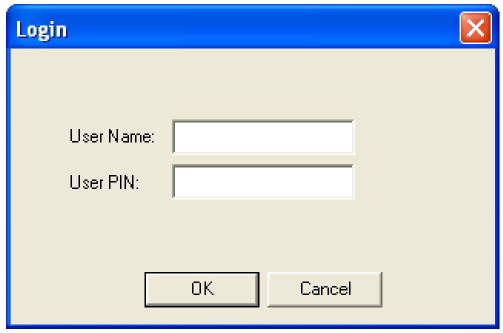


Note
If you want to edit the connection parameters for one or all GCs listed in the *Connect to GC* window, click Edit Directory. The GC Directory window will appear. See "Configuring MON 20/20 to connect to a gas chromatograph" on page 1-10 for more information.

Click the **Ethernet** button beside the GC to which you want to connect.

3. The *Login* dialog appears.

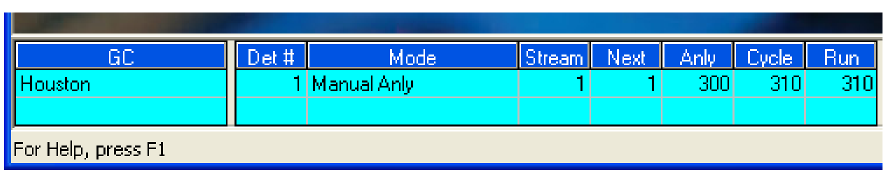
Figure 1-19. The Login window



Note
All GCs are shipped with two default user names: **daniel** and **emerson**. A user pin is not required when using either of these user names and both user names allow administrator-level access to the GC. To add a user pin to either of these user names or for information about creating and edit user names in general, see "Managing users" on page 7-17.

Enter a user name and user PIN and click **OK**. Once connected, the name of the GC appears under the GC column in the GC Status Bar.

Figure 1-20. The GC Status Bar showing a successful connection to a GC



Note
If you enter an invalid user name or password, the *Login* dialog will close without connecting to the GC.

1.2.12 Disconnecting from a gas chromatograph

Disconnecting from a GC will automatically log you off of the GC.

To disconnect from a gas chromatograph, do one of the following:

- On the Toolbar, click  .
- Select **Disconnect** from the **Chromatograph** menu.

Note
If you are connected to a GC and want to connect to a different GC, it is not necessary to disconnect first; simply connect to the second GC, and in the process MON 20/20 will disconnect from the first GC.

1.3 Keyboard commands

You can use the following keyboard keystrokes throughout the program:

Table 1-2. Frequently Used Keystrokes

Keystroke	Action
ARROW keys	Moves cursor: • Left or right in a data field. • Up or down in a menu or combo box. • Up or down (column), left or right (row) through displayed data entries.
DELETE	• Deletes the character after cursor. • Deletes selected rows from a table or return row values to the default settings.
ENTER	Activates the default control element (e.g., the OK button) in current window.
ESC	Exits application or active window without saving data.
F1	Accesses context-sensitive help topics.
INSERT	• Toggles between insert and type-over mode in selected cell. • Inserts a new row above the highlighted row.
SHIFT+TAB	Moves to previous control element (e.g., button) or data field in window; see TAB description.

Table 1-2. Frequently Used Keystrokes (Continued)

Keystroke	Action
SPACE	Toggles settings (via radio buttons or check boxes).
TAB	Moves to the next control element (e.g., button) in the window; to use TAB key to move to next data field, select **Program Settings...** from the **File** menu and clear the **Tab from spreadsheet to next control** check box.

You can use the following function keys from the main window:

Table 1-3. Main menu function keys

Function Key	Action
F2	Starts the Auto-Sequencing function. See “Auto sequencing” on page 6-2 for more information.
F3	Halts the GC (e.g., an analysis run) at the end of the current cycle. See “Halting an analysis” on page 6-1 for more information.
F5	Displays the Timed Event table per specified stream. See “Managing timed events” on page 4-17 for more information.
F6	Displays the Component Data table per specified stream. See “Managing Component Data Tables” on page 4-5 for more information.
F7	Displays the chromatogram for the sample stream being analyzed. See “Viewing a live chromatogram” on page 2-3 for more information.
F8	Displays any chromatogram stored in the GC Controller. See “Viewing an archived chromatogram” on page 2-5 for more information.

1.4 Procedures guide

Use the following table to look up the related manual section, menu path and, if appropriate, the keystroke for a given procedure.

Table 1-4. MON 20/20 Task List

Task or Data Item	Section(s)	Menu Path [Keystroke]
24-hour average, component(s) measured	4.5.2	Application → Calculations → Averages...
Add a gas chromatograph	1.2.6	File → GC Directory
Alarms, related components	4.2 4.8 3.4	Application → Component Data... [**F6**] Application → Limit Alarms → User... Hardware → Discrete Outputs...
Alarms, stream number(s) programmed	4.8	Application → Limit Alarms → User...
Analysis Report (on/off)	5.7.3	Logs/Reports → Printer Control...
Analysis time	4.3.4	Application → Timed Events... [**F5**]
Starting or ending auto-calibration	4.10	Application → Streams...
Auto-calibration interval	4.10	Application → Streams...
Auto-calibration start time	4.10	Application → Streams...
Autocal time	4.10	Application → Streams...
Baseline	4.10	Application → Streams...
Base pressure used for calculations	4.10	Application → Streams...
Calibration concentration	4.2	Application → Component Data... [**F6**]
Calibration cycle time	4.3.4	Application → Timed Events... [**F5**]
Calibration runs, number averaged	4.10	Application → Streams...
Calibration runs, number of	4.10	Application → Streams...
Calibration stream number	4.10	Application → Streams...

Table 1-4. MON 20/20 Task List

Task or Data Item	Section(s)	Menu Path [Keystroke]
Communications	4.12	Application → Communication... Application → Ethernet Ports...
Component code and name	4.2	Application → Component Data... [**F6**]
Component full scale (for output)	4.1 3.6	Application → System... Hardware → Analog Outputs...
Component(s) programmed for input	3.5 3.3	Application → Analog Inputs... Application → Discrete Inputs...
Component(s) programmed for output	4.8 3.6 3.4	Application → Limit Alarms → User... Hardware → Analog Outputs... Hardware → Discrete Outputs...
Component, retention time	4.2	Application → Component Data... [**F6**]
Component zero (for output)	3.6	Hardware → Analog Outputs...
Compressibility (on/off)	4.5.1	Application → Calculations → Control...
Current date	2.6	Chromatograph → View/Set GC Time...
Current time	2.6	Chromatograph → View/Set GC Time...
Cycle time	4.3.4	Application → Timed Events... [**F5**]
Delete alarms	4.8 5.1	Application → Limit Alarms... Logs/Reports → Alarms → Alarm Log...
Delete component from component list	4.2	Application → Component Data... [**F6**]
Delete inhibit, integration, peak width	4.3.4	Application → Timed Events... [**F5**]
Delete output(s)	3.6 3.4	Hardware → Analog Outputs... Hardware → Discrete Outputs...
Enable or disable multi-user write	4.1	Application → System...
Existing alarm(s)	5.1	Logs/Reports → Alarms → Alarm Log...
Full-scale value (for input)	3.5	Hardware → Analog Inputs...
GPM liquid equivalent (on/off)	4.5.1	Application → Calculations → Control...

Table 1-4. MON 20/20 Task List

Task or Data Item	Section(s)	Menu Path [Keystroke]
Height or area measurement method	4.2	Application → Component Data... [**F6**]
High alarm	4.8	Application → Limit Alarms → User...
(Analyzer) I.D.	4.1	Application → System...
Inhibit on-off times	4.3.4	Application → Timed Events... [**F5**]
Input(s) being used	3.5 3.3	Hardware → Analog Inputs... Hardware → Discrete Inputs...
Integration on-off times	4.3.4	Application → Timed Events... [**F5**]
Low alarm	4.8	Application → Limit Alarms → User...
Mole percent (on/off)	4.5.1	Application → Calculations → Control...
Normalization (on/off)	4.5.1	Application → Calculations → Control...
Outputs being used	4.8 3.6 3.4	Application → Limit Alarms → User... Hardware → Analog Outputs... Hardware → Discrete Outputs...
Peak width, on time	4.3.4	Application → Timed Events... [**F5**]
Ratio (on/off)	4.6	Application → Calculations → User Defined...
Ratio denominator	4.6	Application → Calculations → User Defined...
Ratio, stream number(s)	4.6	Application → Calculations → User Defined...
Relative density (on/off)	4.5.1	Application → Calculations → Control...
Response factor	4.2	Application → Component Data... [**F6**]
Response factor, percent deviation	4.2	Application → Component Data... [**F6**]
Retention time, percent deviation	4.2	Application → Component Data... [**F6**]
Spectrum gain	4.3.3	Application → Timed Events... [**F5**]

Table 1-4. MON 20/20 Task List

Task or Data Item	Section(s)	Menu Path [Keystroke]
Stream number(s) (for output)	4.8 3.6 3.4	Application → Limit Alarms → User... Hardware → Analog Outputs... Hardware → Discrete Outputs...
Stream sequences skipped, number	4.1 4.10	Application → System... Application → Streams...
Streams analyzed, number	4.1 4.10	Application → System... Application → Streams...
Streams analyzed, sequence	4.1 4.10	Application → System... Application → Streams...
Valve on/off times	4.3.1	Application → Timed Events... [**F5**]
Weight percent (on/off)	4.5.1	Application → Calculations → Control...
Wobbe value (on/off)	4.5.1	Application → Calculations → Control...
Zero value (for input)	3.5	Hardware → Analog Inputs...

1.5 Configuring a gas chromatograph

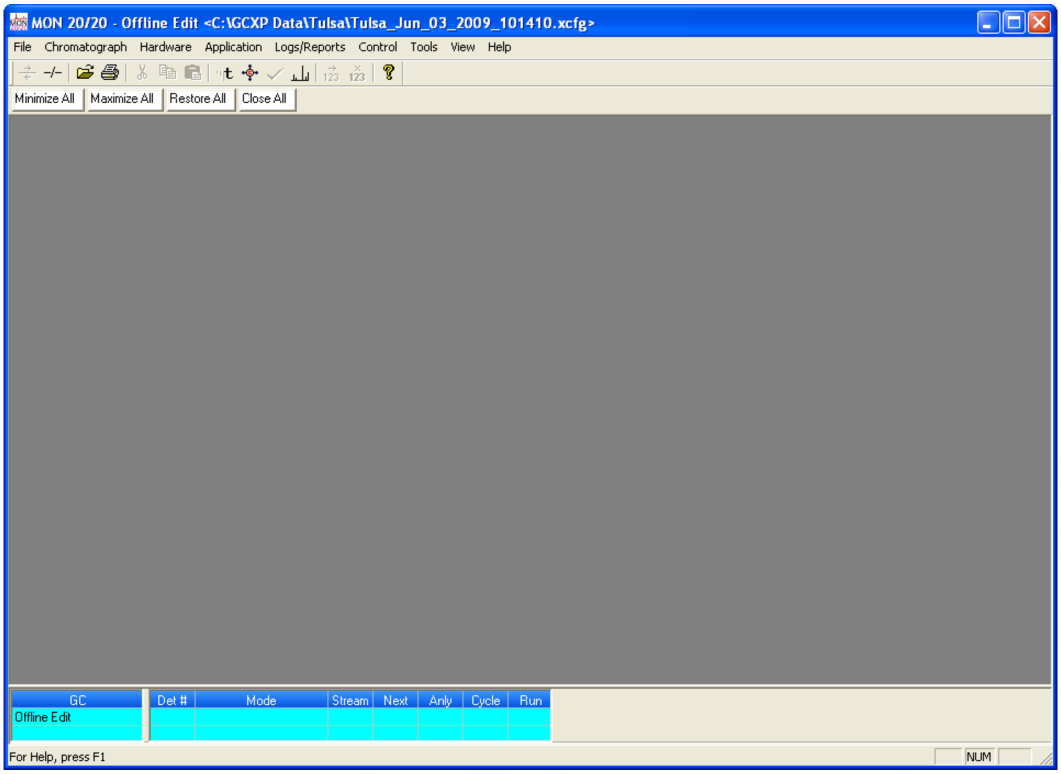
Use the **File** menu to edit, save, and restore configuration files.

1.5.1 Editing a configuration file

To edit a configuration file, do the following:

1. Disconnect from the GC.
2. Select **Open Configuration File...** from the **File** menu. The *Open* dialog displays. Configuration files are saved with the **.xcfg** extension.
3. Locate and select the configuration file that you want to edit and click **Open**. MON 20/20 opens the file in offline edit mode.

Figure 1-21. MON 20/20 in offline edit mode



4. Use the **Application** and **Hardware** menu commands to edit the GC's settings. For more information on these commands, see Section 3 and Section 4.

5. When finished configuring the GC, click to disconnect from the GC and to save the changes to the configuration file and to leave offline edit mode.

1.5.2 Saving a gas chromatograph's current configuration

Configuration files are saved with the .xcfg extension. To save a GC's current configuration to a PC, do the following:

1. Select **Save Configuration (to PC)...** from the **File** menu. The *Save as* dialog displays.
2. Give the file a descriptive name or use the pre-generated file name and navigate to the folder to which you want to save the file.
3. Click **Save**.

1.5.3 Importing a configuration file

To import a new configuration into a GC or to restore a GC's previous configuration, do the following:

Note
The current configuration will be overwritten, so be sure to save it before importing a new or previous configuration.

Note
The GC should be in Idle mode while performing this task.

---

1. Select **Restore Configuration (to GC)...** from the **File** menu. The *Open* dialog displays. Configuration files are saved with the **.xcfg** extension.
2. Locate and select the configuration file that you want to import and click **Open**. The file's data is loaded into the GC.

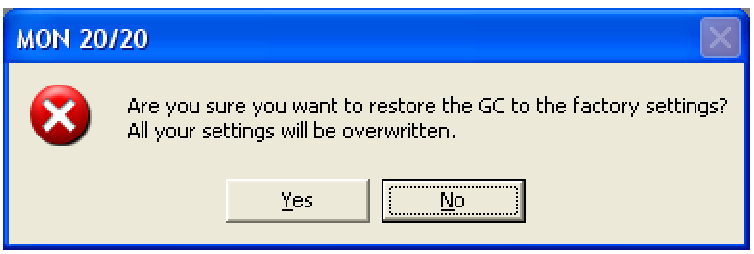
1.6 Restoring the GC to its factory settings

The GC's default timed event, component data and validation data tables are created at the factory and are not accessable by users. To restore these tables to their default values, do the following:

Note
The GC should be in Idle mode while performing this task.

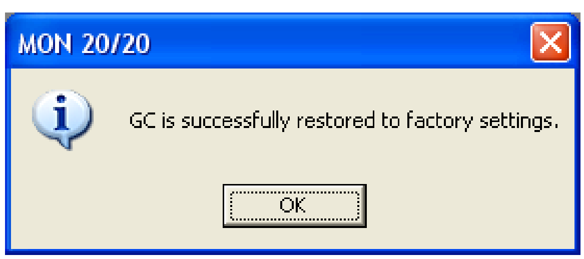
1. With the GC idle, select **Restore to Factory Settings...** from the **File** menu. The following warning message displays:

Figure 1-22. Restore to Factory Settings warning message



2. Click **Yes**. The MON 20/20 restores the default values to the GC's data tables. When the process is completed, the following message displays:

Figure 1-23. Restoration completed message

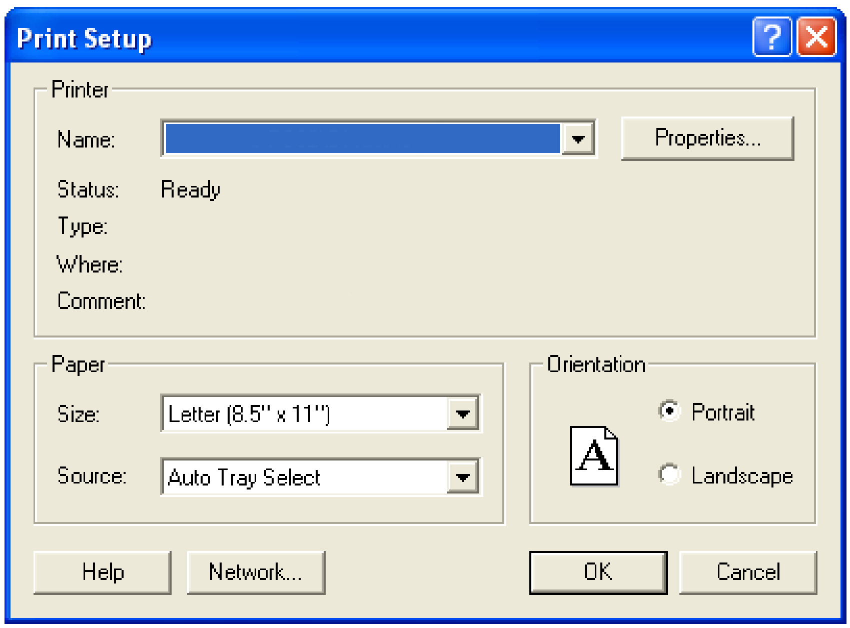


3. Click **OK**.

1.7 Configuring your printer

Select **Print Setup...** from the **File** menu to configure the settings for the printer connected to your PC. These settings will apply to any print job queued from MON 20/20, such as the reports that are configured by the Printer Control. See "Printing reports automatically" on page 5-44 for information.

Figure 1-24. The Print Setup dialog



The settings available depend on the printer model. Refer to the printer manufacture's user manual for more information.

Note
Your new configuration will be cleared, i.e., the settings will return to the default values, when you exit MON 20/20.

1.8 Using online help

Currently, the online help feature contains all user information and instructions for each MON 20/20 function as well as the MON 20/20 system.

To access the online help, do one of the following:

- Press **F1** to view help topics related to the currently active dialog or function.
- Select **Help Topics** from the **Help** menu to view the help contents dialog.

1.9 Operating modes for MON 20/20

The GC supports two different operating modes. Each mode allows the GC to analyze data from a given number of detectors, streams, and methods, as detailed in Table 1-5.

Table 1-5. Operating Modes for MON 20/20

Mode ID Number	Detectors Supported	Streams Supported	Methods Supported
0	1	1	1
1	2	1	1

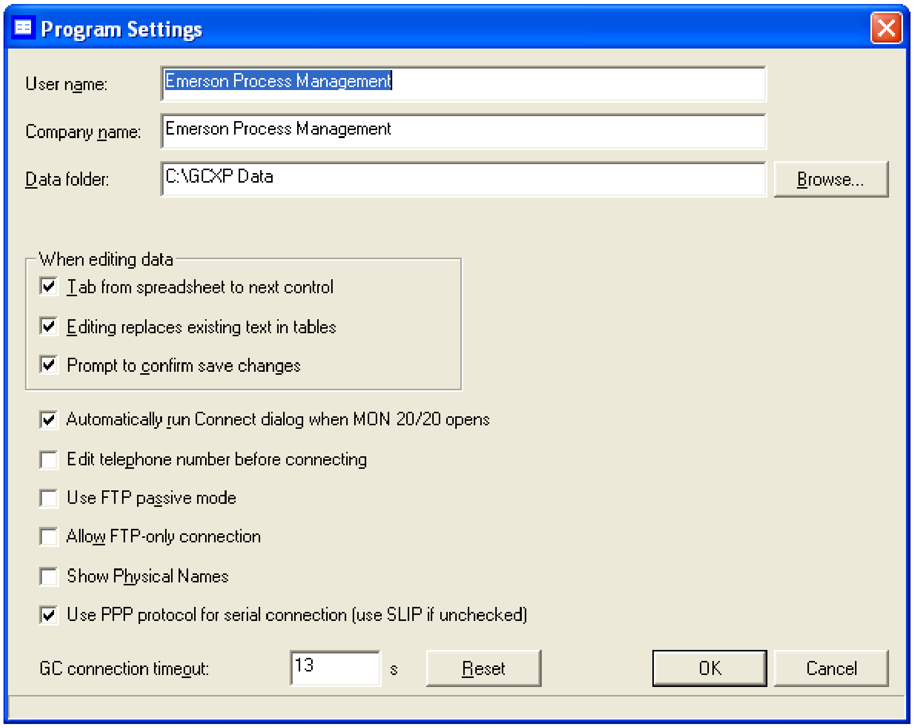
1.10 Viewing the Physical Name column

Most MON 20/20 hardware windows contain a hidden column called *Physical Name* that lists the default name for the associated GC device, such as the analog inputs or electronic pressure controls. It might be useful to know a device's physical name while troubleshooting.

To view hidden columns, do the following:

1. Select **Program Settings...** from the **File** menu. The *Program Settings* window displays.

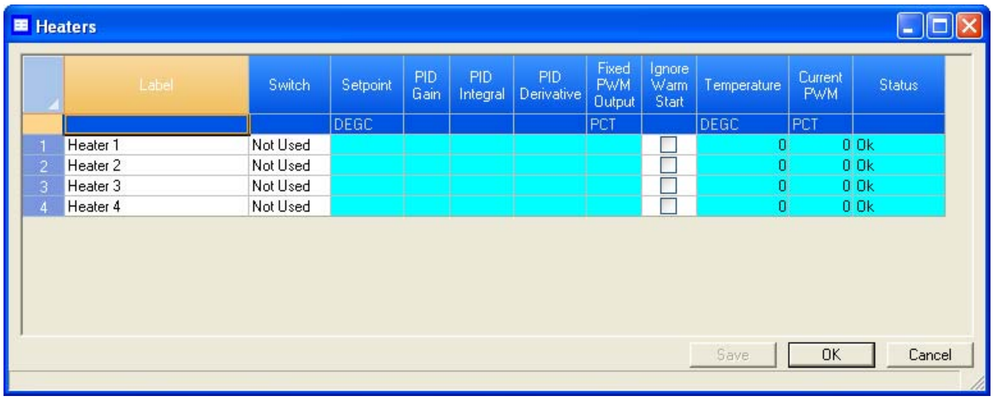
Figure 1-25. The Program Settings window



2. Select the *Show Physical Names* checkbox.

3. Click **OK**. The *Physical Name* column now will be visible on all windows that have the column, such as the *Heater* window shown in the example below.

Figure 1-26. The Heater window showing Physical Name column



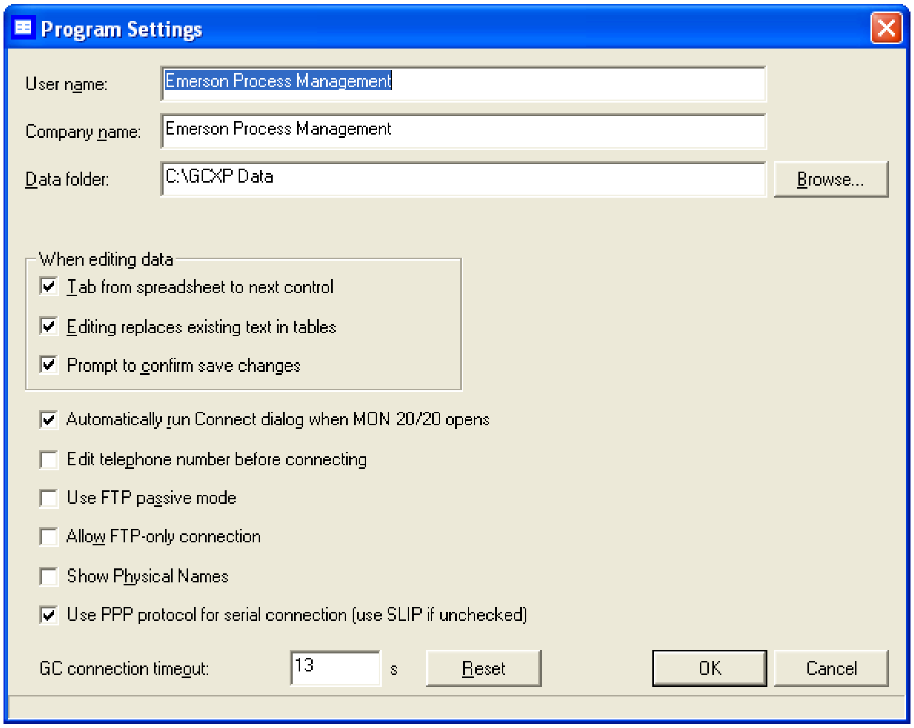
1.11 Selecting the GC's networking protocol

MON 20/20 can connect to the GC using one of two networking protocols: PPP or SLIP. If the version level of the GC's firmware is 1.2 or lower, MON 20/20 should be configured to use the SLIP protocol; otherwise, the PPP protocol should be used.

To select the GC's networking protocol, do the following:

1. Select **Program Settings...** from the **File** menu. The *Program Settings* window displays.

Figure 1-27. The Program Settings window

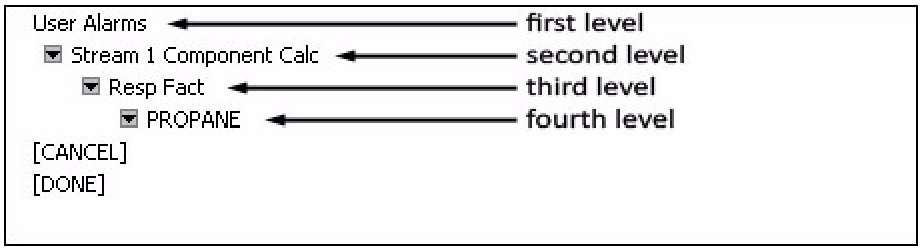


2. To use the PPP protocol, make sure the *Use PPP protocol for serial connection (use SLIP if unchecked)* checkbox is selected; to use the SLIP protocol, make sure the *Use PPP protocol for serial connection (use SLIP if unchecked)* checkbox is not selected.
3. Click **OK**.

1.12 Using the context-sensitive variable selector

The MON 20/20 method for selecting variables for calculations and other purposes is based on a simple, self-contained system.

Figure 1-28. Example of a context-sensitive variable selector

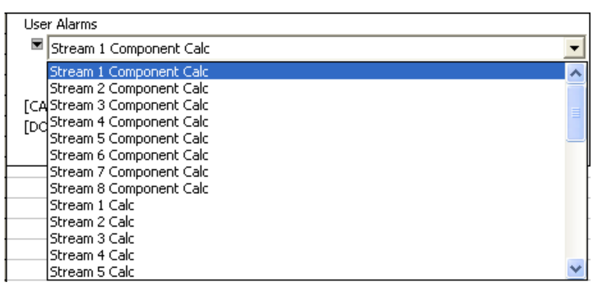


The context-sensitive variable selector consists of a first-level element, called the *context*, that is followed by a series of tiered, drop-down lists. The options available from the drop-down lists depend upon the context element.

The following example explains how to use the context-sensitive variable selector to select a user alarm variable:

1. Click on the **second-level** drop-down list. The full list of available streams displays.

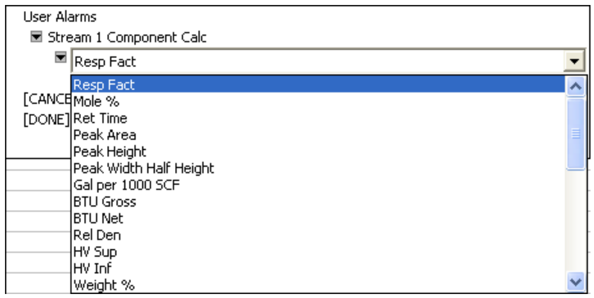
Figure 1-29. Second-level drop-down list



2. Select the stream you want to use for the alarm.

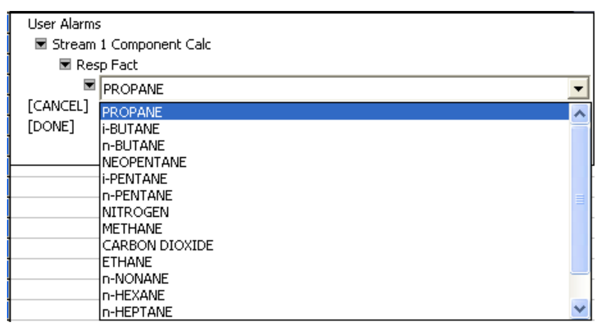
3. Click the **third-level** drop-down list. The full list of available user alarm variables displays.

Figure 1-30. Third-level drop-down list



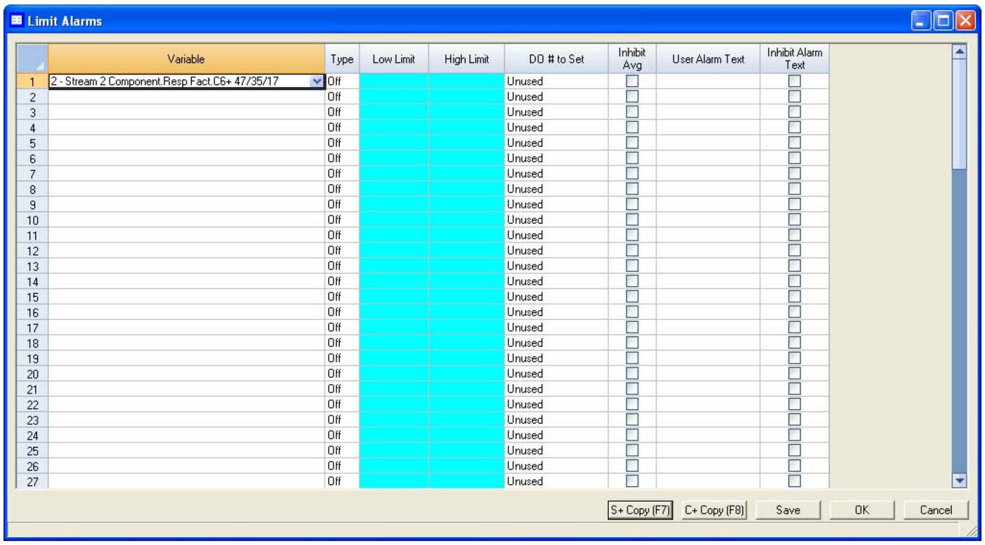
4. Select the variable you want to use for the alarm. If there are components associated with the variable, the **fourth-level** drop-down list will display.
5. If displayed, click the **fourth-level** drop-down list. The full list of available components displays.

Figure 1-31. Fourth-level drop-down list

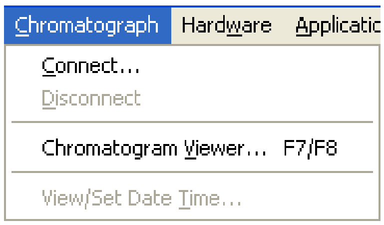


6. Select the component you want to use for the alarm.
7. Click **[Done]**. The context-sensitive variable selector closes and the variable displays in the *Variable* field.

Figure 1-32. Variable selected



Section 2: Using the chromatograph functions



For viewing and managing chromatograms, MON 20/20 is flexible and straighforward. This chapter shows you how to connect to and disconnect from a gas chromatograph. This chapter also shows you how to access the Chromatogram Viewer, as well as to use it to view, print and manipulate various types of chromatograms.

Finally, this chapter explains how to set a gas chromatograph's date and time.

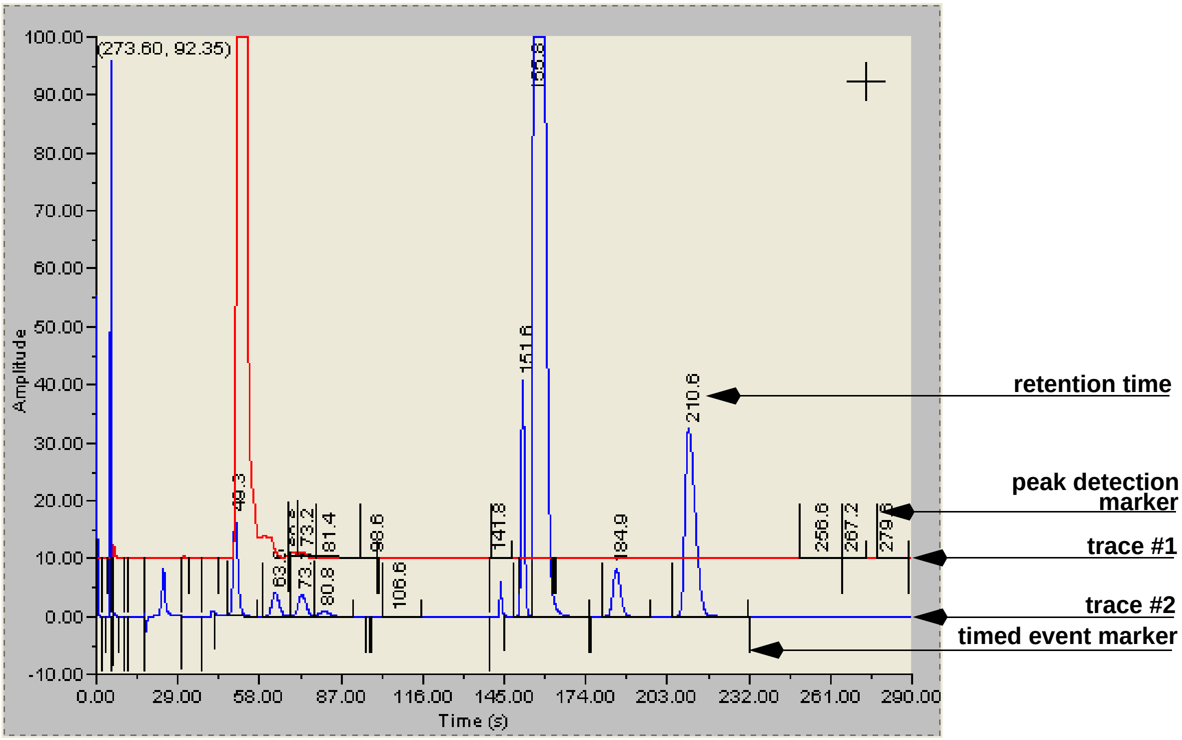
2.1 Viewing chromatograms

Use the Chromatogram Viewer to display and print live, archived, or saved chromatograms. There is no limit to the number of archived and saved chromatograms that can be displayed at once; however, to maximize performance, the number of chromatograms displayed should be limited to 25 or less. The Chromatogram Viewer can display all three types of chromatograms together, alone, or in any combination.

The Chromatogram Viewer contains a host of information about both current and past GC analyses, and it contains just as many ways of editing and manipulating that data.

2.1.1 Data displayed in the chromatogram window

Figure 2-1. The chromatogram window



The following elements are displayed in the chromatogram window:

- The chromatogram. A *trace* is the graphical representation of the analysis results from a single detector; a *chromatogram* is the collection of all traces and associated data that are generated by a gas chromatograph's detector or detectors. Each trace displays in a different color.
- Retention times. The retention time for each peak displays above it.
- Baselines. The baseline projects from the beginning to the end of a peak. The baseline can be turn on or off by clicking **Baselines**.

- Timed event markers. These markers, which correspond to events from the Timed Events table, display on the chromatogram as black marks descending from the trace-line. There are three types of timed event markers:
  - Valve events display as long descending marks.
  - Integration events display as medium descending marks.
  - Spectrum gain events display as short descending marks.
- Peak detection markers. These markers display on the chromatogram as black marks ascending from the trace-line. Each peak has two peak detection markers: one at its beginning and one at its end.

2.1.2 Viewing a live chromatogram

To view a live chromatogram, do the following:

1. Connect to the GC.
2. Select **Chromatogram Viewer...** from the **Chromatograph** menu.

Note

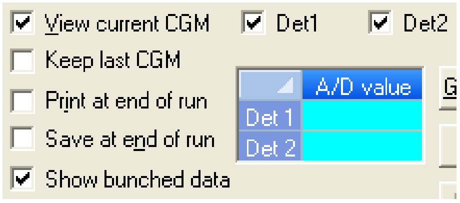
Another way to display the Chromatogram Viewer is to click  , which is located on the Toolbar.

WARNING

To prevent the loss of any new data, be sure to save the chromatogram before closing the Chromatogram Viewer. For more information, see “Saving a chromatogram trace” on page 2-25.

3. From the Chromatogram Viewer window, check **View current CGM**.

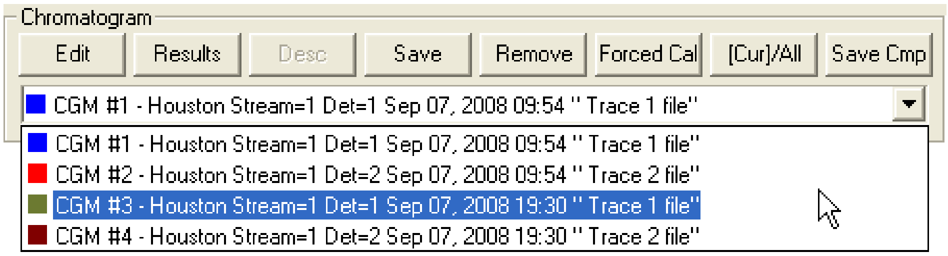
Figure 2-2. View Current CGM



The chromatogram displays in the chromatogram window. If the chromatogram contains one trace, the *Det1* checkbox is automatically checked; if the chromatogram contains two traces, the *Det1* and *Det2* checkboxes are automatically checked. To remove a trace, uncheck its detector checkbox.

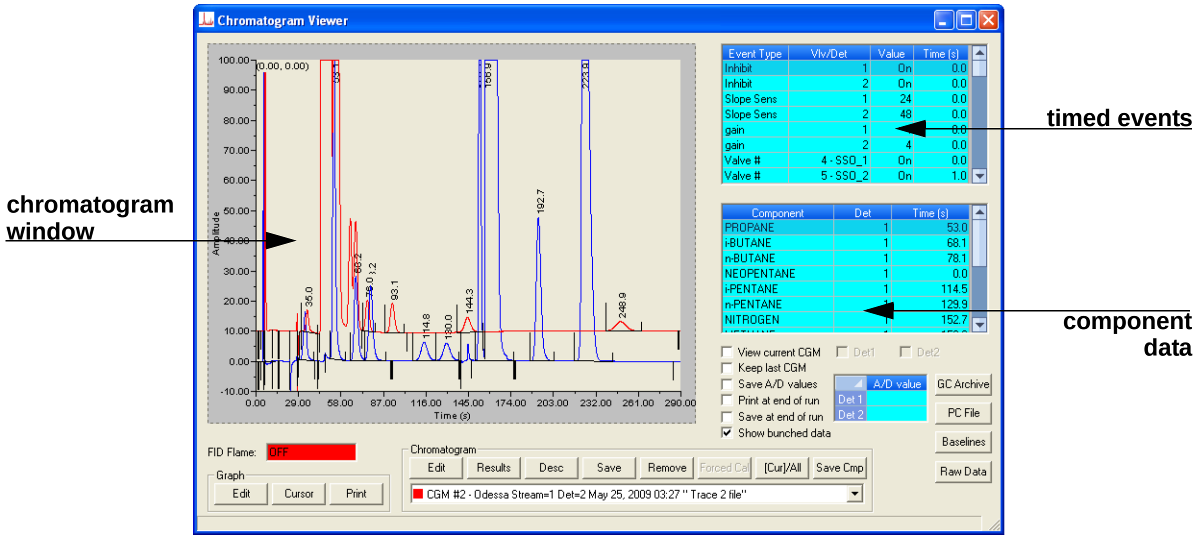
Each trace that displays is color-coded; use the Chromatogram pull-down menu to select a specific trace.

Figure 2-3. Chromatogram pull-down menu



The list of GC events associated with the production of the chromatogram, along with each event's status and time, displays in the *Timed Events* table to the right of the chromatogram display window. The *Component Data* table, to the lower right of the chromatogram display window, lists the components measured during the analysis. These tables are updated in real-time, just as the chromatogram is.

Figure 2-4. The Chromatogram Viewer



Note
By default, the timed events and component data tables are configured to scroll to and highlight the next occurring event in the analysis cycle. To disable this feature, right-click on one of the tables and uncheck the Auto Scroll option on the pop-up menu.

2.1.3 Viewing an archived chromatogram

Archived chromatograms are stored on the GC, so you must be logged in to access them. With MON 20/20 archived chromatograms as old as four days are available for viewing.

Archived chromatograms are sorted and displayed on four tabbed panes:

- **Chromatograms** - This view displays all chromatogram types sorted by time so that the newest file is always listed first. This view can be further configured to display only the files from the last five runs for each stream, or to display all the files that are stored on the GC.

- **Protected chromatograms** - Protected chromatograms are never deleted from the GC. To protect a chromatogram, see “Protecting or unprotecting an archived chromatogram” on page 2-9.

Note

Protected chromatogram files have a “lock” icon ( ) displayed beside them.

- **Final Calibration chromatograms** - MON 20/20 will store up to one year’s worth—or approximately 370—of final calibration chromatograms; once the limit is reached, MON 20/20 will delete the oldest non-protected final calibration chromatogram for each new final calibration chromatogram that is created. If multiple final calibration chromatograms are created on the same day, the last chromatogram created is archived, unless MON 20/20 has been configured to archive all final calibration chromatograms.

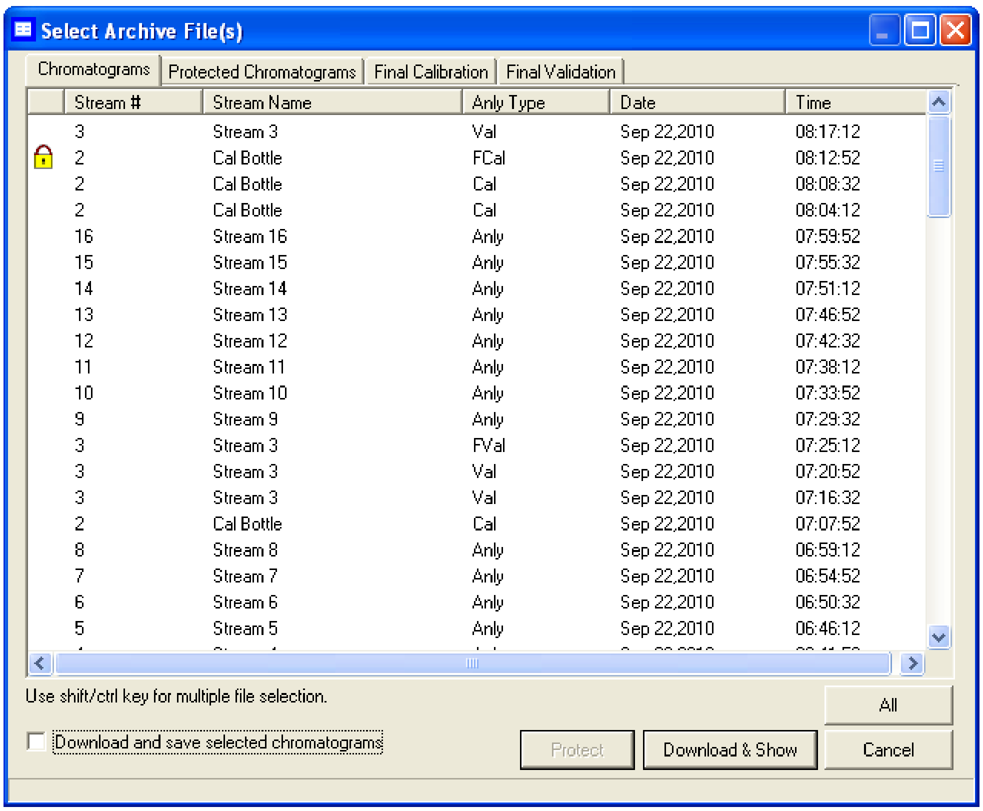
Note

See “Managing the system” on page 4-2 to learn how to configure MON 20/20’s archiving behavior.

Final Validation chromatograms - These chromatograms are treated in the same manner as final calibration chromatogram files.To view one or more archived chromatograms, do the following:

1. Click **GC Archive**. The *Select archive file(s)* window appears.

Figure 2-5. The Select archive file(s) window



The files can be sorted by date, file name, analysis type, time, or stream number by clicking the appropriate column header. By default, they are sorted by date, with the newest file listed first.

Note

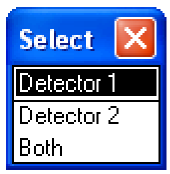
By default, only recent chromatograms—that is, the last five runs for each stream—are displayed. To view all archived chromatograms, click **All**. To return to viewing only recent chromatograms, click **Recent**.

2. Select one or more archive files by clicking them. Use the SHIFT or CTRL key to make multiple selections.

Note
To save the selected files to the PC, select the *Download and save selected chromatograms* check box and click **Download & Save**.

3. Click **Download & Show**. The *Select* window displays for each chromatogram that contains data from more than one detector.

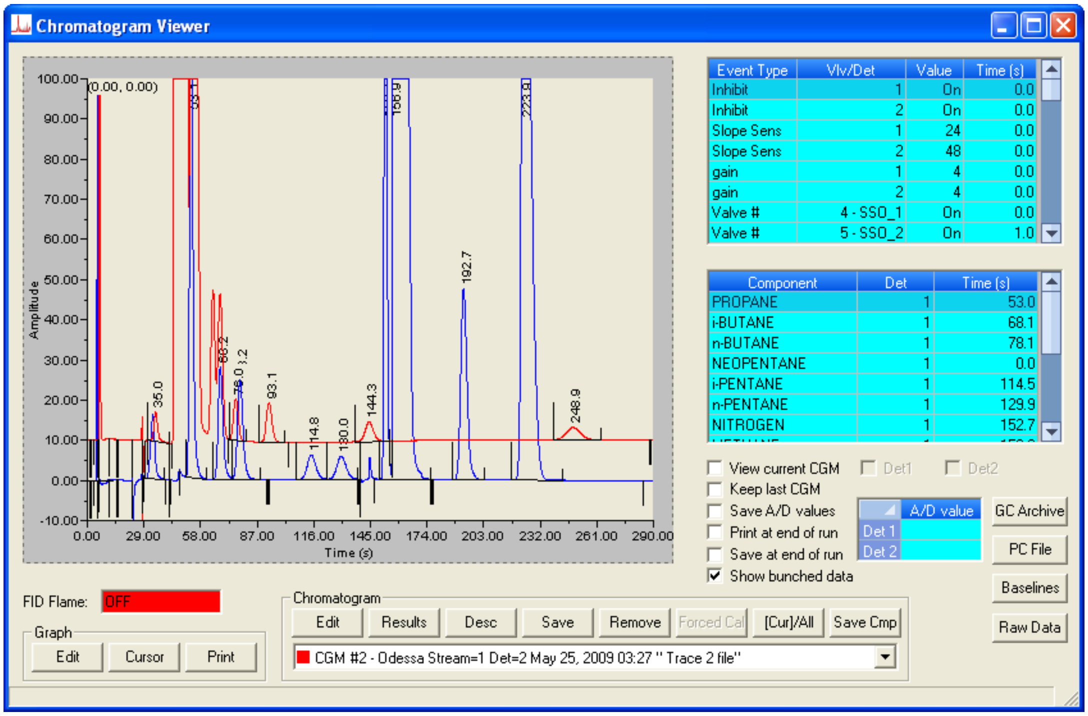
Figure 2-6. The Select window



4. For each chromatogram, double-click either “Detector 1”, “Detector 2”, or “Both” from the *Select* window.

   MON 20/20 plots the archived chromatogram(s) and the corresponding data displays in the timed event and component data tables.

Figure 2-7. The Chromatogram Viewer displaying an archived chromatogram



2.1.4 Protecting or unprotecting an archived chromatogram

By default, archived chromatograms are not saved indefinitely. Once the GC's storage capacity for archived chromatograms has been reached, the oldest archived chromatograms are deleted to make room for the newest archived chromatograms.

If you have a chromatogram that you would like to preserve, it is possible to do so by protecting it. Protected chromatograms will not be deleted to accomodate newer chromatograms. To delete a protected chromatograms, it must first be unprotected. MON 20/20 will save up to 100 protected chromatograms.

Note

Protected chromatograms have a “lock” icon ( ) displayed beside them.

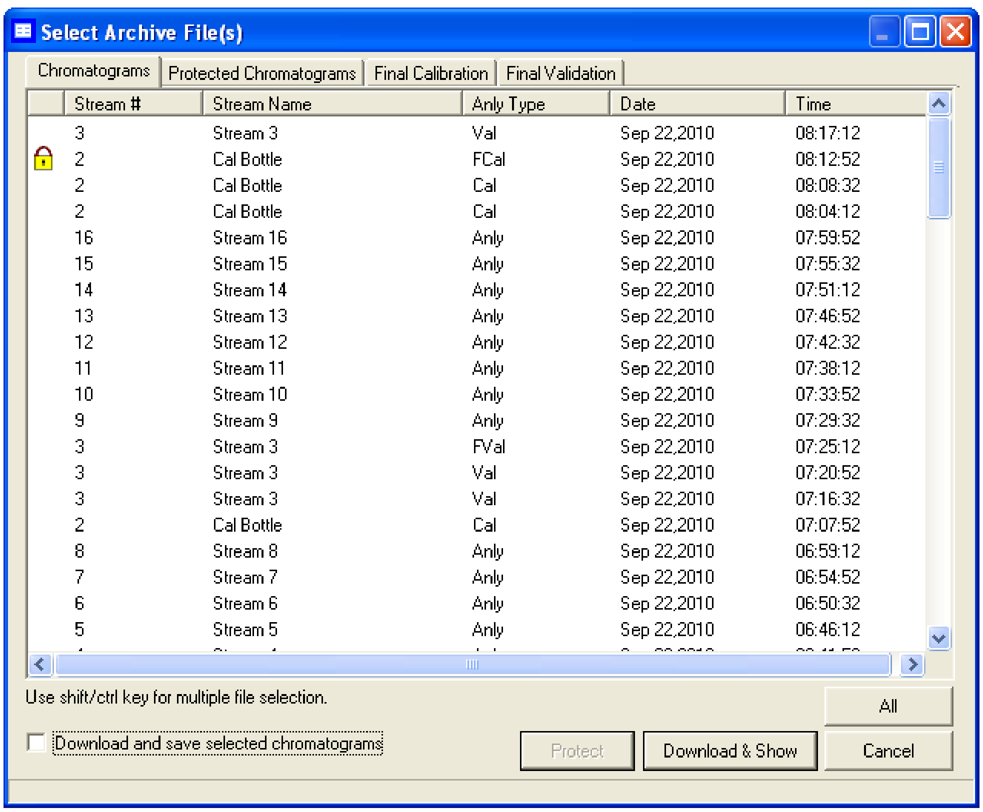
Note

To protect an archived chromatogram you must be logged in as a supervisor or admin.

To protect a chromatogram, do the following:

1. Click **GC Archive**. The *Select Archive File(s)* window appears.

Figure 2-8. The Select archive file(s) window



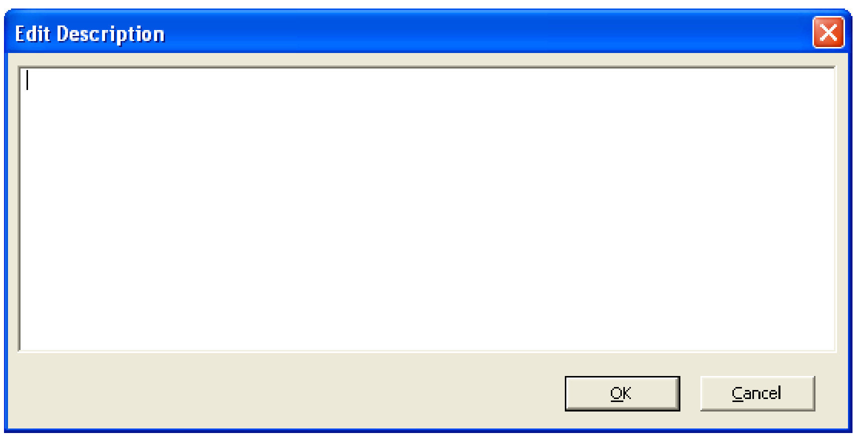
The chromatograms can be sorted by date, file name, analysis type, time, or stream number by clicking the appropriate column header.

By default, they are sorted by date, with the newest chromatogram listed first.

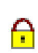
Note
By default, only recent chromatograms—that is, the last five runs for each stream—are displayed. To view all archived chromatograms, click **All**. To return to viewing only recent chromatograms, click **Recent**.

2. Make sure the *Chromatogram* tab is selected and then select the appropriate archived chromatogram by clicking it. Use the SHIFT or CTRL key to make multiple selections.
3. Click **Protect**. The *Edit Description* window displays.

Figure 2-9. The Edit Description window



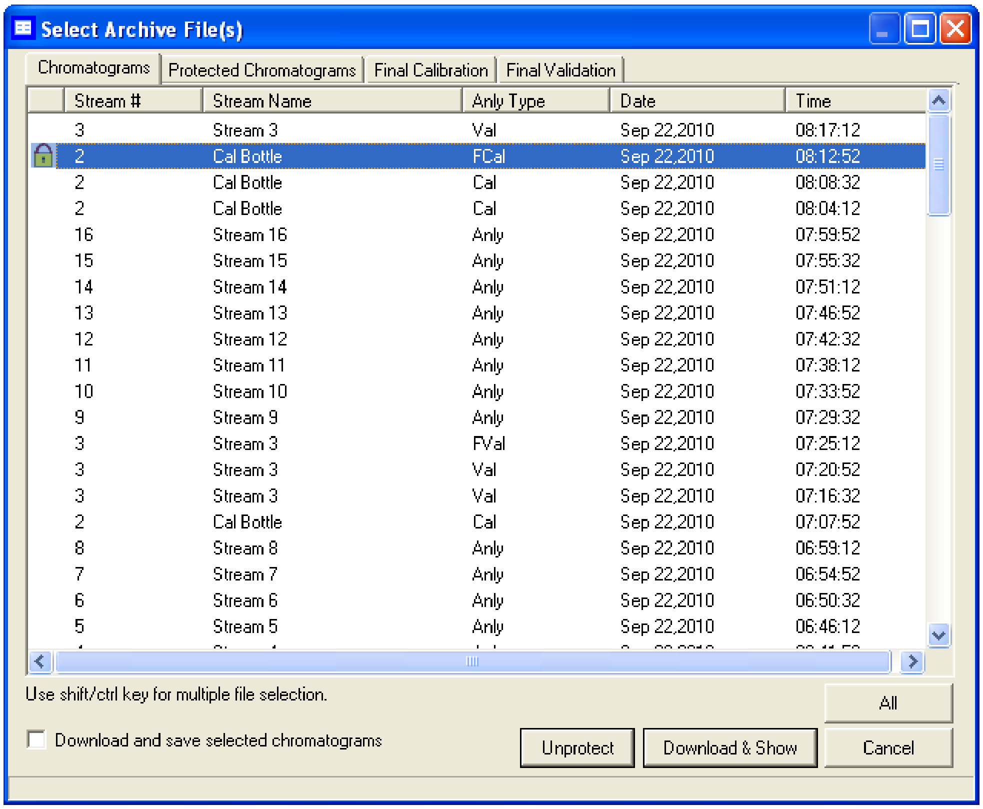
4. Enter any information that you would like to have associated with the chromatogram and then click **OK**. If you do not want to enter any information, click **Cancel**.

MON 20/20 will place a "lock" icon () beside the selected chromatogram to verify its protected status. You can also click on the *Protected Chromatograms* tab to view your newly protected archived chromatogram.

To unprotect a protected file, do the following:

1. Click **GC Archive**. The *Select archive file(s)* window appears.

Figure 2-10. The Select archive file(s) window



2. Locate and select the protected chromatogram that you want to unprotect. Use the SHIFT or CTRL key to make multiple selections.

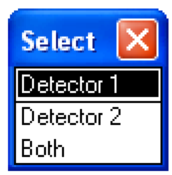
3. Click **Unprotect**. MON 20/20 will remove the “lock” icon ( ) from beside the selected chromatogram. The chromatogram’s description information, if any, will also be deleted. This chromatogram is now eligible to be deleted to make room for newer archived chromatograms.

2.1.5 Viewing a saved chromatogram

To view a chromatogram that was saved to disk, do the following:

1. Click **PC File**. The *Open* dialog appears.
2. Navigate to the desired .xcgm file or .xcmp comparison file and select it. To make multiple selections, use the SHIFT or CTRL key.
3. Click **OK**. The *Select* window displays for each chromatogram that contains data for more than one detector.

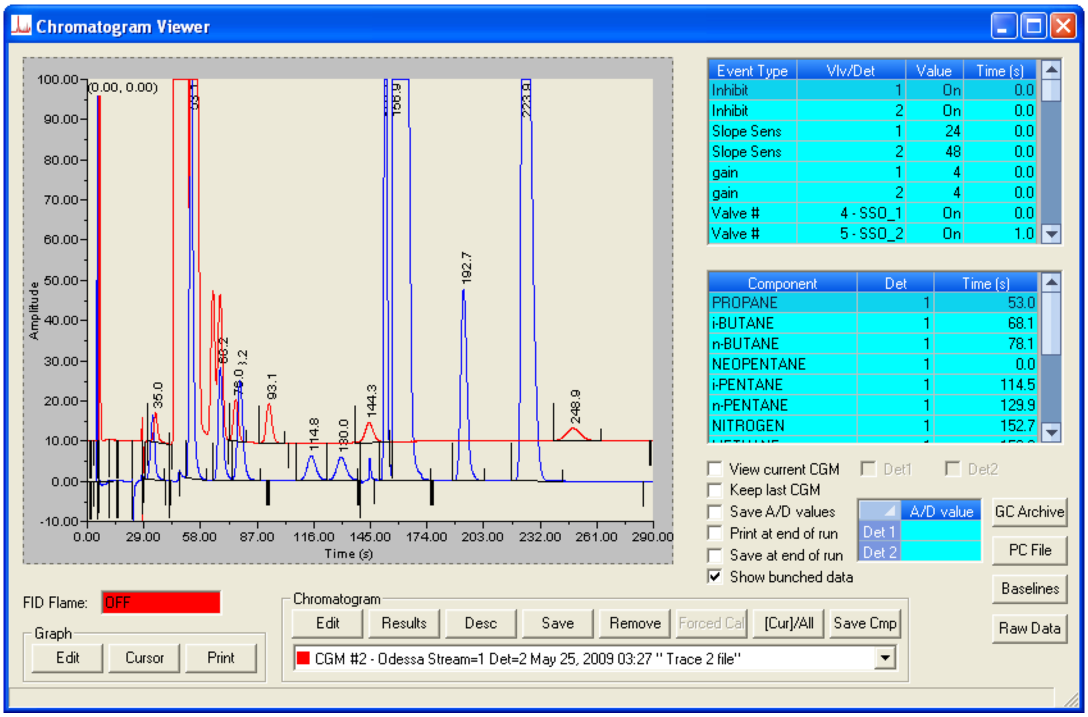
Figure 2-11. The Select window



4. For each chromatogram, double-click either “Detector 1”, “Detector 2”, or “Both” from the *Select* window.

   MON 20/20 plots the archived chromatogram(s) and the corresponding data displays in the timed event and component data tables.

Figure 2-12. The Chromatogram Viewer displaying a saved chromatogram



2.2 Working with the graph

Right-clicking with the mouse on the graph brings up the following commands and keyboard shortcuts:

Command Name	Shortcut	Description
Zoom In	"+" (NUMPAD)	Zooms in on the entire graph. **NOTE**: Another way to zoom in is by clicking and dragging your mouse to select the region of the graph that you want to zoom in on.
Zoom Out	"-" (NUMPAD)	Zooms out from the entire graph.
Zoom X In	"6" (NUMPAD)	Zooms in on the X axis.
Zoom X Out	"4" (NUMPAD)	Zooms out from the X axis.
Zoom Y In	"8" (NUMPAD)	Zooms in on the Y axis.
Zoom Y Out	"2" (NUMPAD)	Zooms out from the Y axis.
Save State	CTRL + HOME	Saves current or archived display settings for the selected chromatogram. **NOTE**: The Save State function is available only when viewing a live or archived chromatogram.
Restore State	HOME	Restores the last saved display settings for the selected chromatogram. **NOTE**: Pressing **HOME** returns the user to the saved state.
Toggle Full Screen	F11	Toggles the display of the Chromatogram Viewer's tables and buttons and maximizes the chromatogram window.
Cursor to Nearest Point	F8	Snaps the cursor to the nearest point on the chromatograph in both the X and Y directions.
Toggle Coarse/ Fine Cursor	F4	Toggles the cursor from coarse and less accurate to fine and more accurate.
Toggle Lines/Dots Displays	F9	Toggles the chromatographs from lines to dots, or dots to lines.

Command Name	Shortcut	Description
Toggle Mouse Position Tip	CTRL + F4	The graph's cursor follows the movement of the mouse while a hovering tooltip displays the exact coordinates of the current point.
Toggle Nearest Position Tip	CTRL + F9	The graph's cursor follows the movement of the mouse cursor.
Print	CTRL + P	Prints the chromatogram.
Copy to clipboard	CTRL + C	Copies from the graph the raw detector data that was used to plot the selected chromatogram. This data can be pasted into another application such as Microsoft Word or Microsoft Excel.
Paste from clipboard	CTRL + V	Plots a range of points copied from another application such as Microsoft Word or Microsoft Excel.

2.3 Editing the display properties of the chromatograph

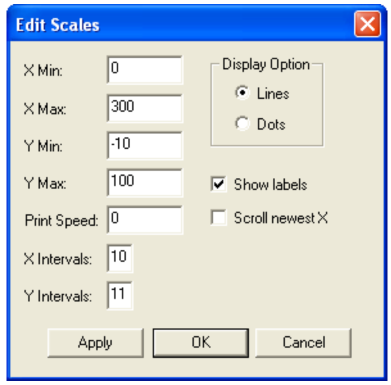
MON 20/20 allows you to change the appearance of many of the chromatogram's elements, such as its x-axis and y-axis values, the color of the chromatograph's background, and the display status of its labels.

2.3.1 The Graph bar

Use the Graph bar buttons to change the display parameters of the chromatogram.

Click **Edit** from the **Graph** bar. The *Edit Scales* window displays.

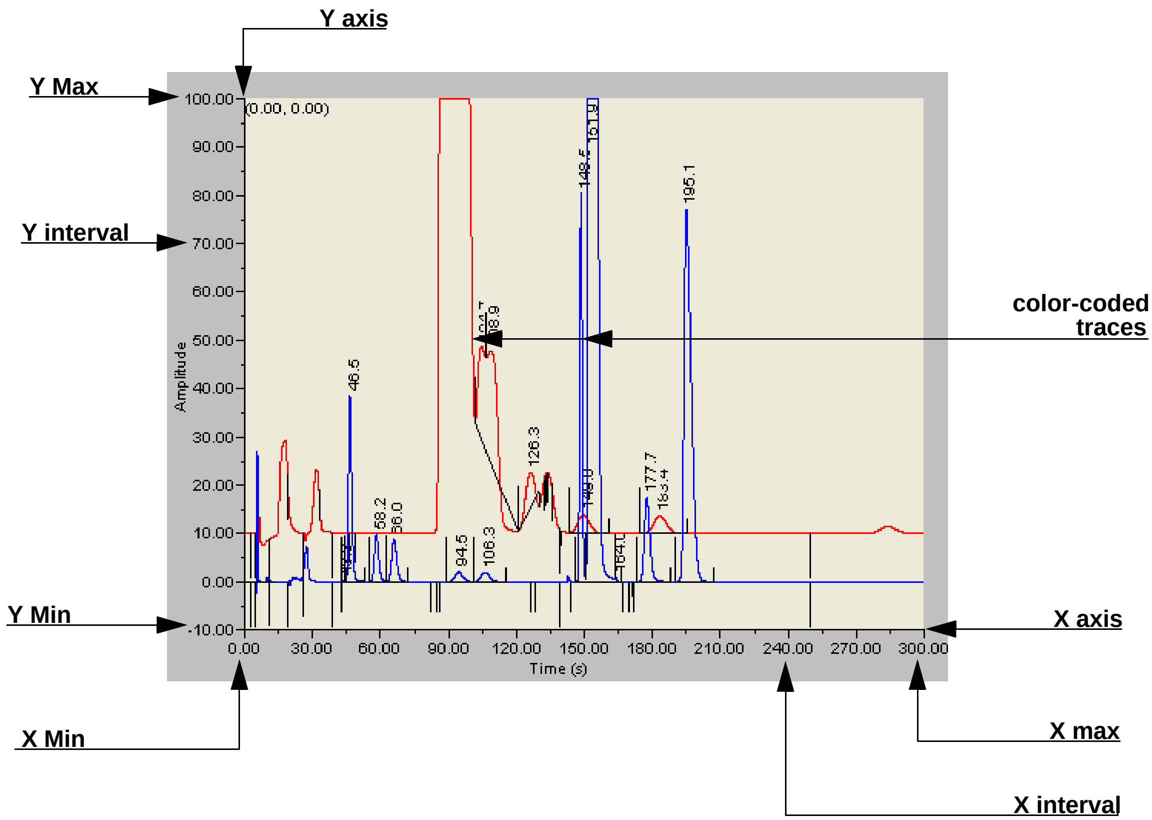
Figure 2-13. The Edit Scales window



The following table lists the parameters that can be edited:

Command	Description	Default Value
X Min	Sets the minimum value, in seconds, for the X axis.	0
X Max	Sets the maximum value, in seconds, for the X axis. The is value is determined by the Timed Events table.	100
Y Min	Sets the minimum value for the Y axis.	-10
Y Max	Sets the maximum value for the Y axis.	100
Print Speed	Sets the number of inches per second for the x-axis while printing a chromatogram, similar to an XY plotter.	0
X Intervals	Sets the number of intervals to be displayed on the graph for the X axis.	10
Y Intervals	Sets the number of intervals to be displayed on the graph for the Y axis.	11
Display Option	Determines whether the chromatograph is displayed as a solid line or as a dotted line. Lines is checked by default.	Lines
Show labels	Toggles the display of the graph labels.	Checked
Scroll newest X	Determines whether the graph's window moves to focus on the most recent data point along the x axis. This feature only applies to live chromatograms.	Unchecked

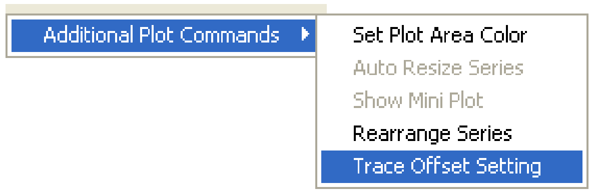
Figure 2-14. A chromatogram



To see how your changes affect the graph, click **Apply**. To accept your changes, click **OK**.

- Click **Cursor** to toggle the cursor size from coarse movement (less accurate) to fine movement (more accurate).
- Click **Print** to print the chromatogram window.

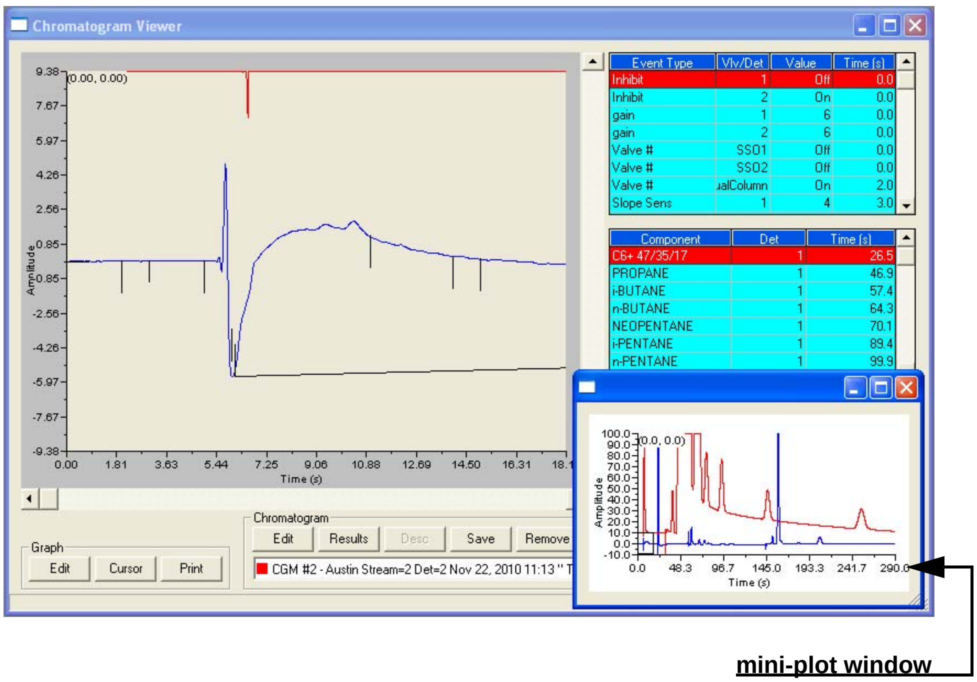
2.3.2 Additional plot commands



In addition to the Graph bar, there are a few other commands available that allow you to manipulate the look and feel of the graph. To access the additional plot commands menu, right-click on the Chromatogram Viewer anywhere except on the graph or the timed event and component data tables. The additional commands are:

Command	Description
Set Plot Area Color	Changes the color of the graph's background. This may be necessary to make the chromatograms more visible. The default RGB color values are 236, 233, and 216.
Auto Resize Series	Scales down the X-axis and the Y-axis to fit the entire chromatogram onto the window.

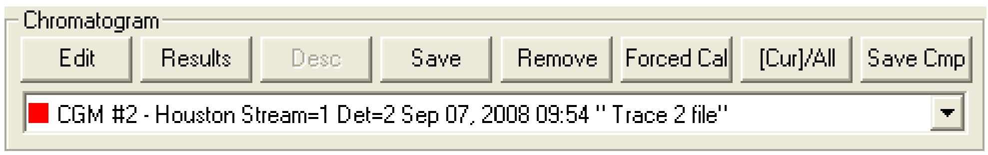
Command	Description
Show Mini Plot	Toggles the display of a smaller version of the chromatogram in a separate, resizable window. This allows you to keep an overview of the entire graph at all times, especially when zoomed in. This window automatically displays whenever you zoom in on the original chromatogram.



Rearrange Series	Resizes and offsets two or more traces so that they can both be fully displayed on the graph. To offset a trace means to raise its Y-axis relative to the Y-axis of the previous trace so that one trace is not drawn over the other but instead one trace is drawn above the other.
Trace Offset Settings	Indicates the amount of offset between two or more traces. To offset a trace means to raise its Y-axis relative to the Y-axis of the previous trace so that one trace is not drawn over the other but instead one trace is drawn above the other. If two detectors are in use, each set of traces can be offset independently--that is, the traces for one detector can be offset relative to each other, but independent of the traces from the second detector.

2.4 Working with a chromatogram

Figure 2-15. The Chromatogram bar



The Chromatogram bar contains a row of buttons that allows you to manipulate a single chromatogram. Below the row of buttons is the chromatogram pull-down menu, which contains a list of all of the currently displayed chromatograms/traces. Before you can work with a chromatogram you must first select it from the pull-down menu.

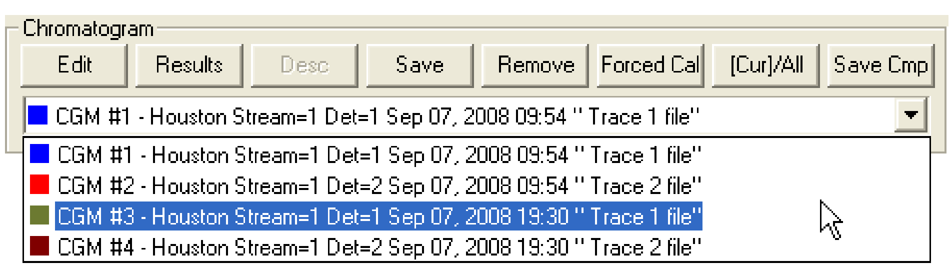
2.4.1 Editing a chromatogram trace

You can use the Edit function to change the X and Y offset values for a trace, as well as its color. These changes may be necessary to make the trace more distinguishable from those that surround it, or to align a trace with a different trace for comparison.

To edit a trace, do the following:

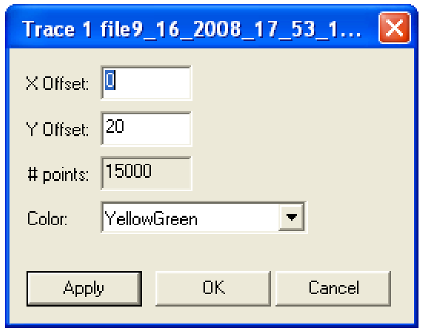
1. Select the trace that you want to edit from the Chromatogram pull-down menu.

Figure 2-16. Chromatogram pull-down menu



2. Click **Edit**. The *Edit Chromatogram* dialog appears.

Figure 2-17. The Edit Chromatogram dialog



Command	Description
X Offset	Enter a positive number to move the trace to the right, or a negative number to move the trace to the left.
Y Offset	Enter a positive number to move the trace up, or a negative number to move the trace down.
# points	Number of data points in the trace. This field is read-only.
Color	Assigns a color to the trace.

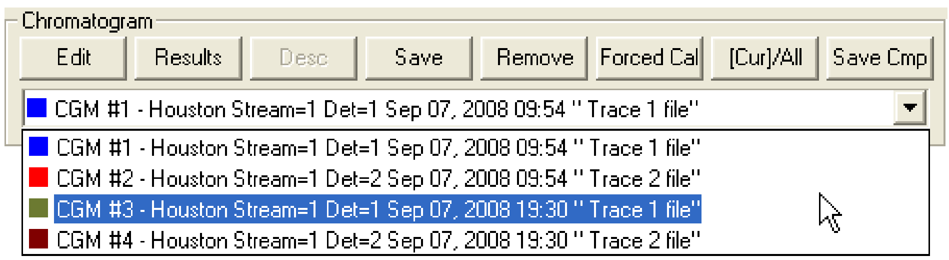
3. To see how your changes affect the trace, click **Apply**. To accept your changes, click **OK**.

2.4.2 Viewing chromatogram results

To display a table of calculation results for a trace, do the following:

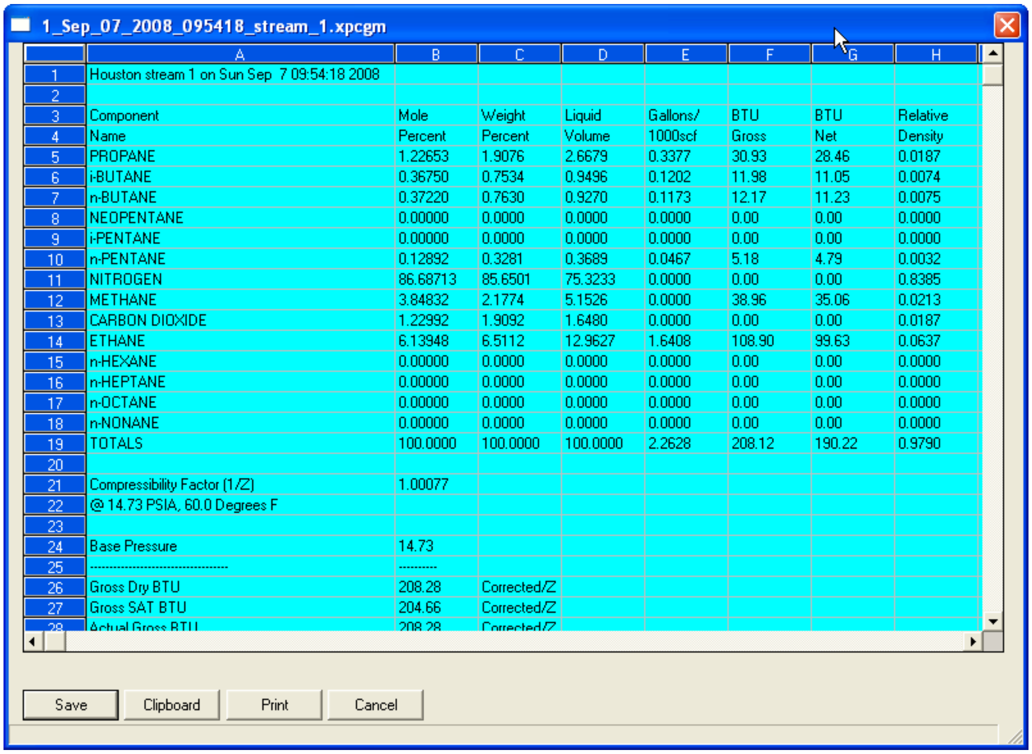
1. From the Chromatogram pull-down menu, select the appropriate trace.

Figure 2-18. Chromatogram pull-down menu



2. Click **Results**. A window appears displaying the calculation results for the selected trace.

Figure 2-19. The results window



	A	B	C	D	E	F	G	H
1	Houston stream 1 on Sun Sep 7 09:54:18 2008							
2								
3	Component	Mole	Weight	Liquid	Gallons/	BTU	BTU	Relative
4	Name	Percent	Percent	Volume	1000scf	Gross	Net	Density
5	PROPANE	1.22653	1.9076	2.6679	0.3377	30.93	28.46	0.0187
6	i-BUTANE	0.36750	0.7534	0.9496	0.1202	11.98	11.05	0.0074
7	n-BUTANE	0.37220	0.7630	0.9270	0.1173	12.17	11.23	0.0075
8	NEOPENTANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
9	i-PENTANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
10	n-PENTANE	0.12892	0.3281	0.3689	0.0467	5.18	4.79	0.0032
11	NITROGEN	86.68713	85.6501	75.3233	0.0000	0.00	0.00	0.8385
12	METHANE	3.84832	2.1774	5.1526	0.0000	38.96	35.06	0.0213
13	CARBON DIOXIDE	1.22992	1.9092	1.6480	0.0000	0.00	0.00	0.0187
14	ETHANE	6.13948	6.5112	12.9627	1.6408	108.90	99.63	0.0637
15	n-HEXANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
16	n-HEPTANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
17	n-OCTANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
18	n-NONANE	0.00000	0.0000	0.0000	0.0000	0.00	0.00	0.0000
19	TOTALS	100.0000	100.0000	100.0000	2.2628	208.12	190.22	0.9790
20								
21	Compressibility Factor (1/Z)	1.00077						
22	@ 14.73 PSIA, 60.0 Degrees F							
23								
24	Base Pressure	14.73						
25	----------------------------------	----------						
26	Gross Dry BTU	208.28	Corrected/Z					
27	Gross SAT BTU	204.66	Corrected/Z					
28	Actual Gross BTU	208.28	Corrected/Z					

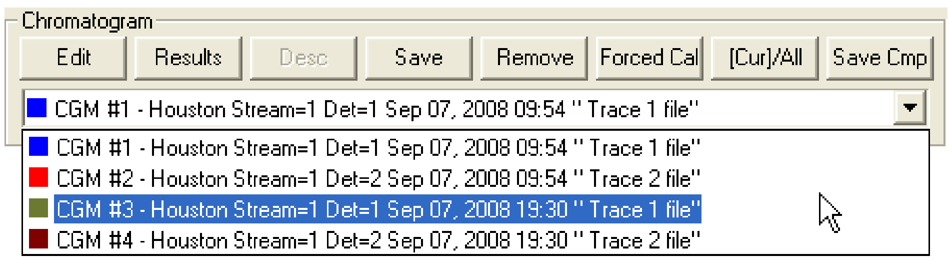
- Click **Save** to save these results in one of the following formats: tab-delimited (.txt), comma-delimited (.csv), Microsoft Excel (.xls), HTM (.htm), or XML (.xml).
- Click **Clipboard** to copy the data to the Windows clipboard, where it can be pasted into another document.
- Click **Print** to print a tab-delimited version of the results.

2.4.3 Saving a chromatogram trace

To save a trace to disk, do the following:

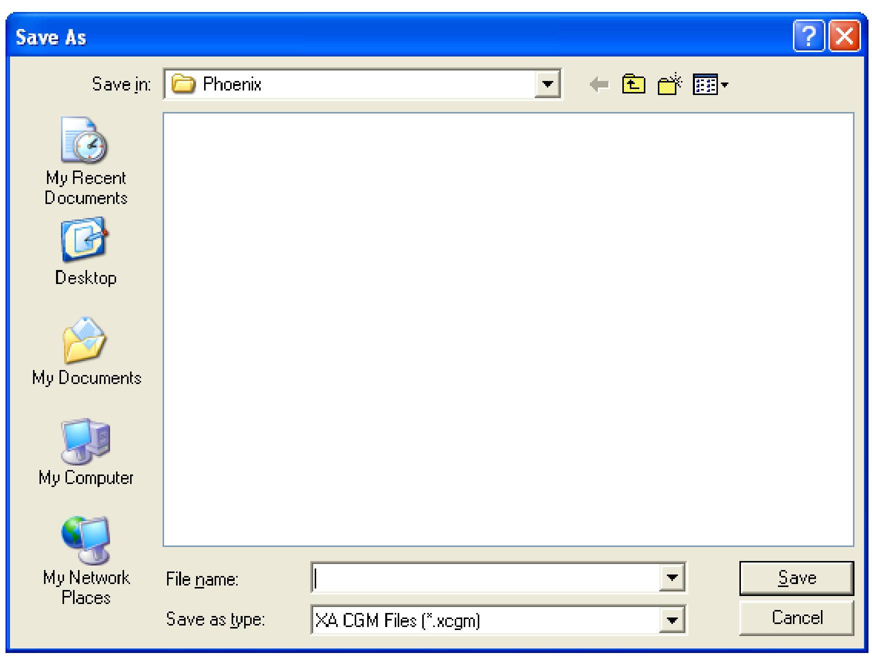
1. From the Chromatogram pull-down menu, select the trace that you want to save.

Figure 2-20. Chromatogram pull-down menu



2. Click **Save**. The **Save As** window displays.

Figure 2-21. The Save As window



3. For convenience the file is given an auto-generated file name that includes the trace's creation date and time; however, you can give the file any name that you choose. Click **Save** and the specified trace will be saved.

2.4.4 Removing a chromatogram trace from view

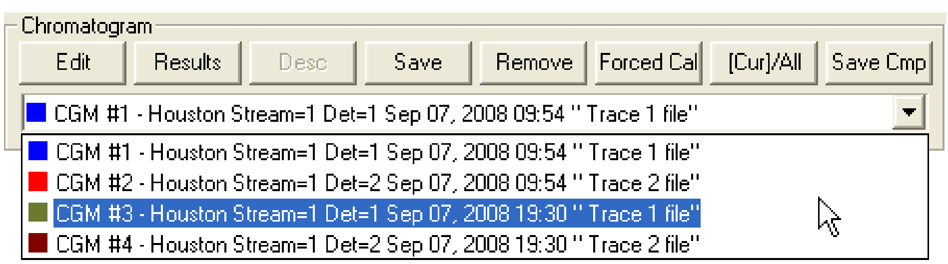
To remove a live trace from the chromatogram window, do one of the following:

- If you want to remove all live traces, click the *View current CGM* check box to uncheck it.
- If you want to remove a single live trace, click the appropriate detector checkbox beside the *View current CGM* check box.

To remove a saved or an archived trace from the chromatogram window and to close the associated .xcgm file, do the following:

1. From the Chromatogram pull-down menu, select the trace that you want to remove.

Figure 2-22. Chromatogram pull-down menu



2. Click **Remove**.

2.4.5 Forcing a calibration

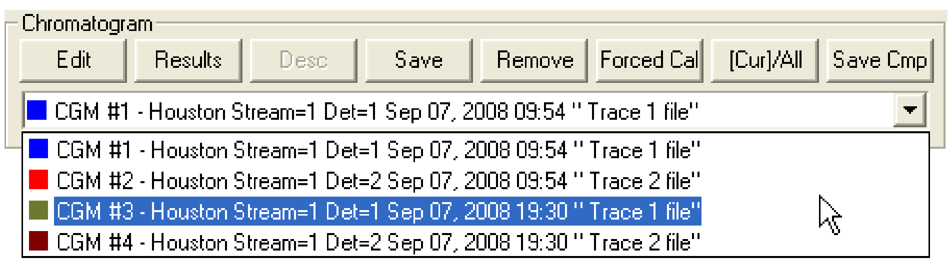
The Forced Cal command uses an archived chromatogram's raw data to calibrate the GC. The calculation results are stored in the component data table for the corresponding stream number.

A major benefit of a forced calibration is increased efficiency. Using a previously validated calibration gas chromatogram removes the necessity for the GC to perform a calibration and validation run before performing an analysis.

To perform a forced calibration, do the following:

1. From the Chromatogram pull-down menu, select the trace that you want to use to calibrate the GC.

Figure 2-23. Chromatogram pull-down menu



2. Click **Forced Cal**.

2.4.6 Controlling the display of data in the Timed Events and Components tables

MON 20/20 can display two levels of information in the Timed Events and component data tables:

- All timed events and all components for all open chromatograms.
- Timed events and components for the currently selected chromatogram.

By default, the two tables show only the timed events and components for the currently selected chromatogram.

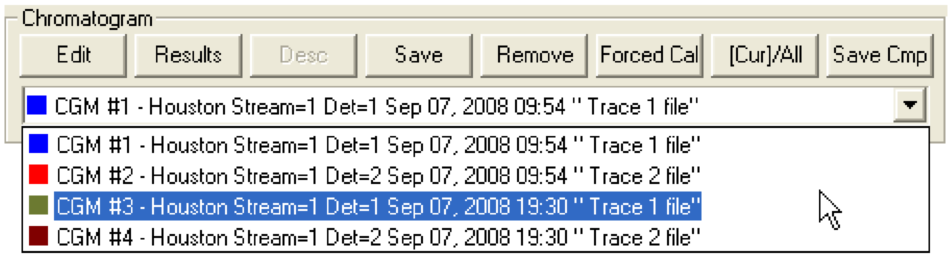
Figure 2-24. Timed events and component data tables showing data for a currently selected trace

Event Type	Vlv/Det	Value	Time (s)
gain	1	3	0.0
gain	1	3	0.0
Valve #	2 - Valve 2	On	0.0
Inhibit	1	On	0.0
Valve #	3 - Valve 3	On	2.0
Slope Sens	1	20	3.0
Valve #	1 - Valve 1	On	5.0
Valve #	4 - Valve 4	On	6.0

Component	Det	Time (s)
Propane	1	45.8
i-Butane	1	61.3
n-Butane	1	71.7
Neopentane	1	79.0
i-Pentane	1	109.8
n-Pentane	1	125.6
Nitrogen	1	148.2

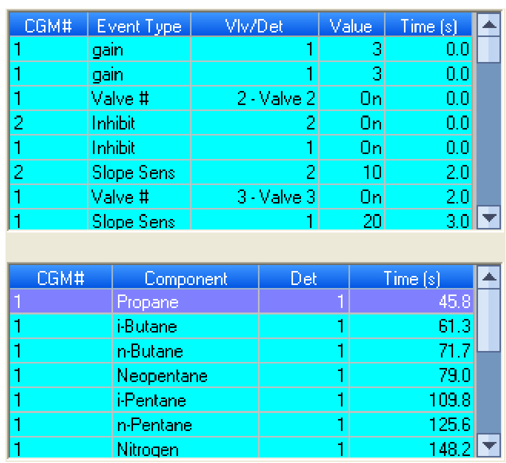
To view the data for a different chromatogram, select the trace from the Chromatogram pull-down menu.

Figure 2-25. Chromatogram pull-down menu



To view all timed events and all components for all open chromatograms, click **Cur/All**.

Figure 2-26. Timed events and component data tables showing data for all currently open traces



CGM#	Event Type	Vlv/Det	Value	Time (s)
1	gain	1	3	0.0
1	gain	1	3	0.0
1	Valve #	2 - Valve 2	On	0.0
2	Inhibit	2	On	0.0
1	Inhibit	1	On	0.0
2	Slope Sens	2	10	2.0
1	Valve #	3 - Valve 3	On	2.0
1	Slope Sens	1	20	3.0

CGM#	Component	Det	Time (s)
1	Propane	1	45.8
1	i-Butane	1	61.3
1	n-Butane	1	71.7
1	Neopentane	1	79.0
1	i-Pentane	1	109.8
1	n-Pentane	1	125.6
1	Nitrogen	1	148.2

Note
The brackets ([ ]) on the Cur/All button indicate which mode is being displayed in the tables.

To toggle back to viewing only the timed events and components for the currently selected chromatogram, click **Cur/All** again.

2.4.7 Saving a comparison file

A comparison file allows you to save your current view, including all open chromatograms, for later review and reuse. To save a comparison file, do the following:

1. Click **Save Cmp**. The *Save As* dialog appears.
2. Navigate to the folder in which you want to save the file.
3. For convenience the file is given an auto-generated file name that includes the current date and time; however, you can give the file any name that you choose.
4. Click **Save**.

2.4.8 Opening a comparison file

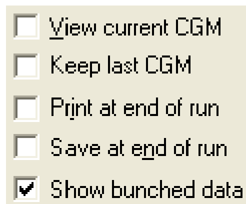
To open a comparison file, do the following:

1. Click **PC File**. The *Open* dialog displays.
2. Select **XA CMP Files (*.xcmp)** from the *Files of type* drop-down menu.
3. Navigate to the folder that contains the comparison file that you want to open and select the file.
4. Click **Open**.

2.5 Miscellaneous commands

The series of check boxes to the right of the graph have the following functions:

Figure 2-27. Miscellaneous options



- **Keep last CGM** - When viewing a live chromatogram, upon starting a new run, MON 20/20 keeps the most recently completed chromatogram on the graph for comparative purposes.
- **Print at end of run** - Prints the chromatogram to the PC's default printer at the end of the run and is unchecked by default.
- **Save at end of run** - Saves the chromatogram to the *Data* folder at the end of the run and is unchecked by default.
- **Show bunched data** - If this box is unchecked, then all of the raw data points are plotted to the chromatogram window; if this box is checked, which is the default option, then each point plotted on the graph represents the average of a group of raw data values. The size of the data group is determined by the peak width value listed in the Timed Events table.

2.5.1 Working with the Timed Events table

Event Type	Vlv/Det	Value	Time (s)
Inhibit	2	On	0.0
Inhibit	1	On	0.0
Peak Width	2	8	0.0
Slope Sens	2	24	0.0
gain	1	4	0.0
gain	2	4	0.0
Valve #	4 - SSO_1	On	0.0
Valve #	5 - SSO_2	On	1.0

The Chromatogram Viewer displays a compact version of the Timed Events table, located on the upper right side of the window. The events displayed in the table are sorted by time. See "Managing timed events" on page 4-17 for more information.

The Timed Event table displays the following data for each event:

Name	Description
Event Type	The type of timed event. These events are mapped to the Time Events window and include Valve, Integration and Gain events.
Vlv/Det	Identifies which valve or detector is involved in the event.
Value	Setting of the event; for example, a valve was turned ON, or the gain was set to **4**.
Time (s)	The number of seconds into the cycle that the event occurred or will occur.

Timed events from live or archived chromatograms can be edited from the Chromatogram Viewer by right-clicking on the Timed Events table. The changes will affect the next analysis run. The following commands are also available by right-clicking on the table:

- **Auto Scroll** - When checked, if a live trace has been selected from the Chromatogram pull-down menu, the Timed Event table will keep its focus on the event closest in time by highlighting that event in dark blue.
- **Save Sheet** - Allows you to save the table to the PC in one of the following formats: TXT, CSV, XLS, HTM, or XML.
- **Copy to Clipboard** - Allows you to copy the table to the clipboard . This data can be pasted into another application such as Microsoft Word or Microsoft Excel.
- **Print Sheet** - Allows you to print the table to your default printer.

2.5.2 Editing Timed Events from the Time Events window

To launch the *Timed Events* dialog directly, right-click on the Chromatogram Viewer's Timed Events table and select **Edit Timed Events Table**. The *Timed Events* dialog displays. See "Managing timed events" on page 4-17 for more information.

2.5.3 Editing Timed Events from the Chromatogram Viewer

To edit timed events from the Chromatogram Viewer, do the following:

1. From the Chromatogram pull-down menu, select the chromatogram whose timed events you want to edit.
2. Depending on the type of event that you want to edit, do the following:
   - To edit valve events, right-click on the Timed Events table and select **Edit Timed Events (Valve Events)**. The Valve Events table from the *Timed Events* dialog displays. See "Editing valve events" on page 4-20 for more information.
   - To edit integration events, right-click on the Timed Events table and select **Edit Timed Events (Integration Events)**. The Integration Events table from the *Timed Events* dialog displays. See "Editing integration events" on page 4-22 for more information.
   - To edit gain events, right-click on the Timed Events table and select **Edit Timed Events (Gain Events)**. The Spectrum Gain Events table from the *Timed Events* dialog displays. See "Editing spectrum gain events" on page 4-26 for more information.
3. To remove a selected event from the table, right-click on the event and select **Delete Row**.

Note
This option is only available while in edit mode.

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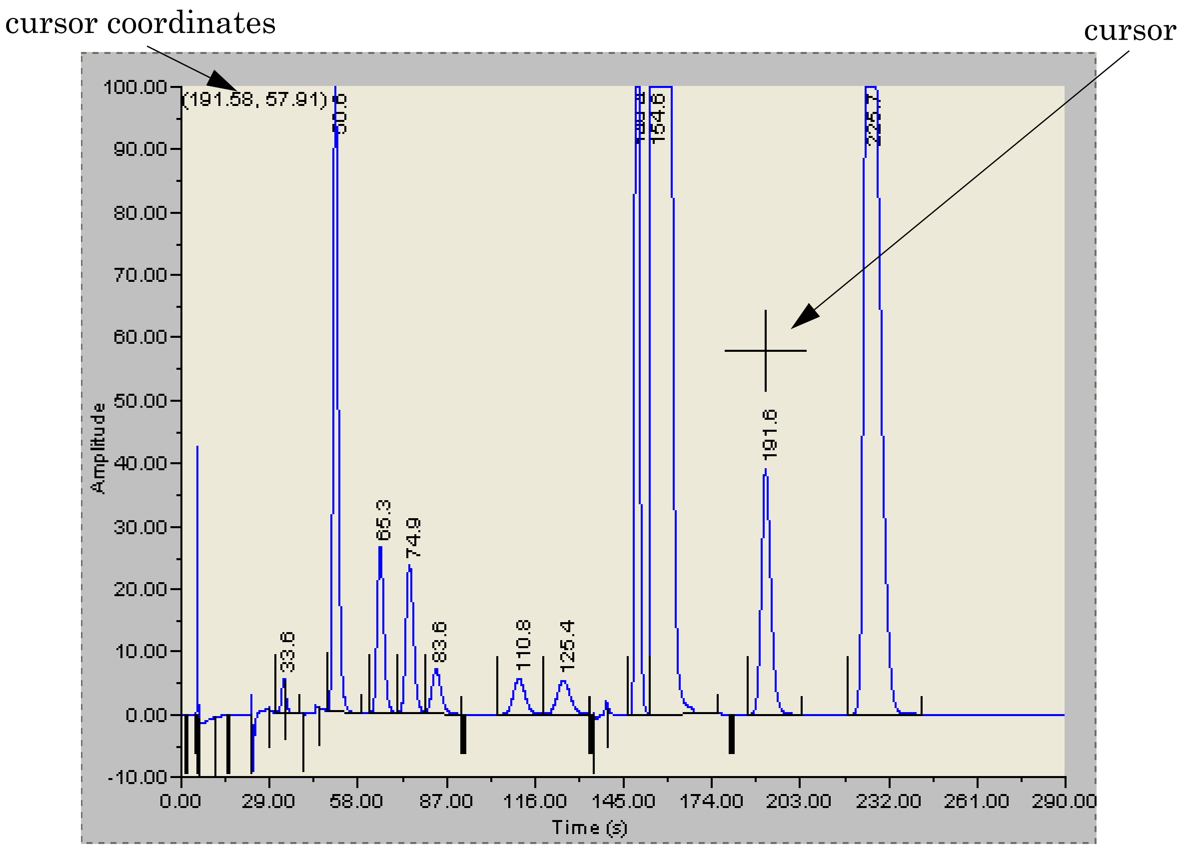
4. To insert an event *above* the currently select event, right-click on the table and select **Insert before**. To insert an event *below* the currently select event, right-click on the table and select **Insert after**. The new row will be added. The options available for configuring the new event depends upon which edit mode you are in—Valve, Integration, or Gain.

Note
These options are only avialable while in edit mode.

5. To save your changes, right-click on the table and select **Save Changes**. The changes will affect the next analysis run. To return to the Timed Events table without saving your changes, select **Discard Changes**.

2.5.4 Using the Chromatogram Viewer's cursor to update a Timed Event

Figure 2-28. Chromatograph cursor



The Chromatogram Viewer has its own cursor that can be displayed by double-clicking within the boundaries of the graph. Once the cursor is displayed, it can be dragged to any point on the graph.

As the cursor moves across the chromatogram, the Timed Event table automatically scrolls to the event that corresponds to the cursor's coordinates.

The cursor can be useful if you want to change a timed event based on the data displayed by the chromatogram.

To update a timed event based on the location of the Chromatogram Viewer's cursor, do the following:

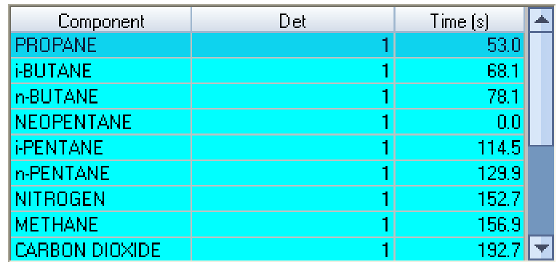
1. Select the live or archived trace that you want to use as the source for changing the timed event.
2. Double-click on the graph to display the cursor. The cursor's coordinates display in the upper left corner of the graph. The x-coordinate represents the analysis time in seconds. With this information in mind, drag the cursor to the desired location.

Note
To toggle the cursor's size between coarse movement (less accurate) and fine movement (more accurate), click Cursor from the Graph bar.

3. Go to the Time Events table and right-click on the event.
4. Select **Update Time from Cursor**. The event's time will be changed to match the cursor's time (x-coordinate).
5. To save your changes, right-click on the table and select **Save Changes**. The changes will affect the next analysis run. To return to the Timed Events table without saving your changes, select **Discard Changes**.

2.5.5 Working with the Component Data Table

The Chromatogram Viewer displays a compact version of the Component Data table beneath the Timed Events table. See "Managing Component Data Tables" on page 4-5 for more information.



The Component Data table displays the following data for each component:

Name	Description
Componet	The name of the component.
Det	Identifies the detector associated with the component.
Time (s)	The retention time for the component.

Retention times for components from live or archived chromatograms can be edited from the Chromatogram Viewer by right-clicking on the Component Data table. The changes will affect the next analysis run. The following commands are also available by right-clicking on the table:

- **Auto Scroll** - When checked, if a live trace has been selected from the Chromatogram pull-down menu, the Component Data table will keep its focus on the component closest in time by highlighting that it in dark blue.
- **Save Sheet** - Allows you to save the table to the PC in one of the following formats: TXT, CSV, XLS, HTM, or XML.
- **Copy to Clipboard** - Allows you to copy the table to the clipboard . This data can be pasted into another application such as Microsoft Word or Microsoft Excel.
- **Print Sheet** - Allows you to print the table to your default printer.

2.5.6 Editing retention times from the Chromatogram Viewer

To edit the retention time for a component, do the following:

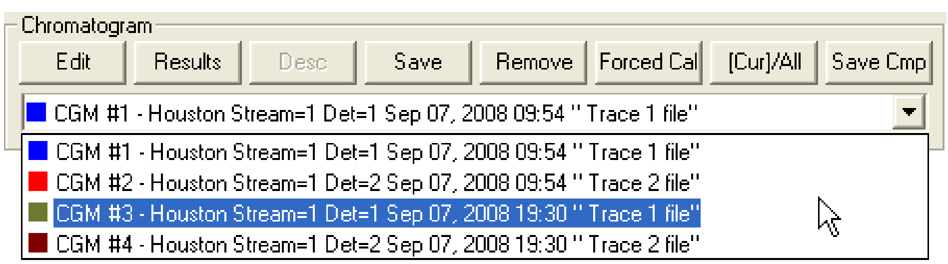
1. Right-click on the Component Data table and select **Edit Retention Times**. The *Ret* column turns white, indicating that its cells are editable.
2. Click on the *Ret* cell for the component that you want edit, and enter a new retention time value, in seconds. The value must be less than the Analysis time.
3. To save your changes, right-click on the table and select **Save Changes**. The changes will affect the next analysis run. To return to the Component Data table without saving your changes, select **Discard Changes**.

2.5.7 Viewing raw data

Use the Raw Data button to display the Raw Data table for the selected trace.

1. Use the Chromatogram pull-down menu to select a specific trace.

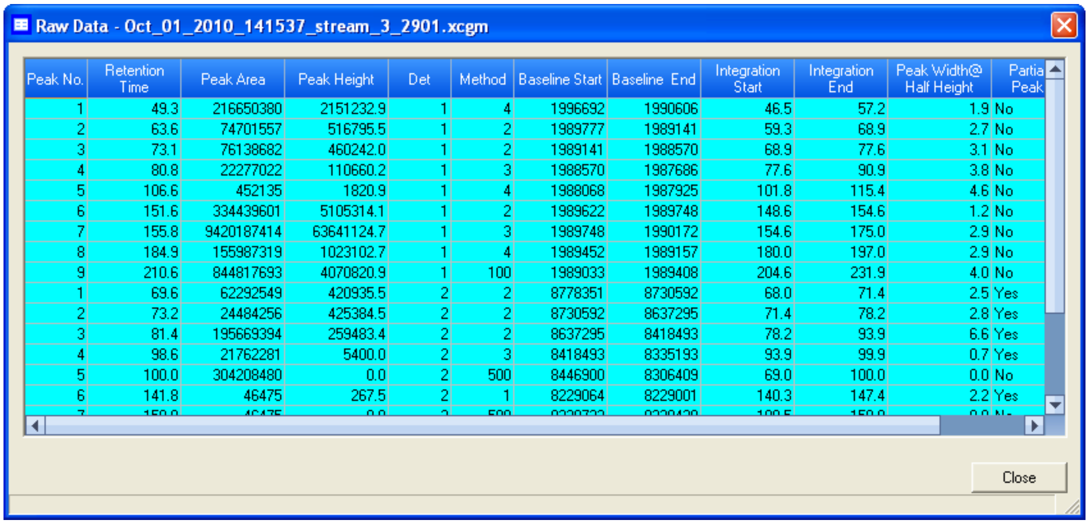
Figure 2-29. Chromatogram pull-down menu



Note
Even though you are selecting a *trace*, the data that is displayed will be fore the *chromatogram*, which may include more than one trace.

2. Click **Raw Data**. The *Raw Data* window displays and shows the raw data for the selected chromatogram.

Figure 2-30. The Raw Data window



The following data displays for each peak from the trace:

Name	Description
No.	Numerical identifier for the peak, listed by the order of discovery.
Ret Time	Time, in seconds, that the component eluted.
Peak Area	The area under the peak.
Peak Height	The maximum height of the peak.
Det	The detector associated with the peak.
Method	Method of peak detection. Options are: • 1 (Baseline) • 2 (Fused Peak) • 3 (Last Fused Peak) • 4 (Tangent Skim) • 100 (Inhibit) • 300 (Forced Integration) • 500 (Summation)
Integ. Start	Time, in seconds, when integration started.

Name	Description
Integ. Stop	Time, in seconds, when integration stopped.
Peak Width Half Height	The width of the peak taken at half of the peak's height.
Is Partial Peak	If Y, then the Partial Peak value is used in the summation calculation; if N, then the Partial Peak value is not used in the summation calculation.

2.6 Setting the gas chromatograph's date and time

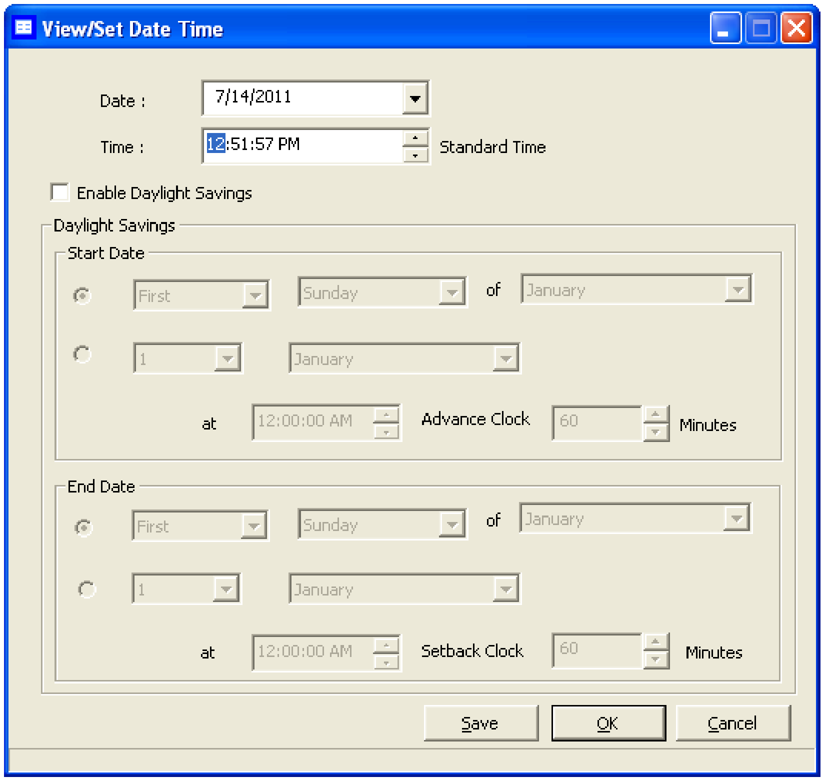
When MON 20/20 connects to a gas chromatograph, the Status Bar displays the gas chromatograph's date and time.

Note
The date and time displayed for the GC may be different from the user's date and time, depending on the physical location of the GC.

To set the gas chromatograph's date and time, do the following:

1. Select **View/Set Date Time...** from the **Chromatograph** menu. The *View/Set Date Time* window displays.

Figure 2-31. The View/Set Date Time window



2. Use the drop-down menus to set the date and time. To enable or adjust daylight savings, see "Adjusting daylight savings" on page 2-42.
3. Click **OK**.

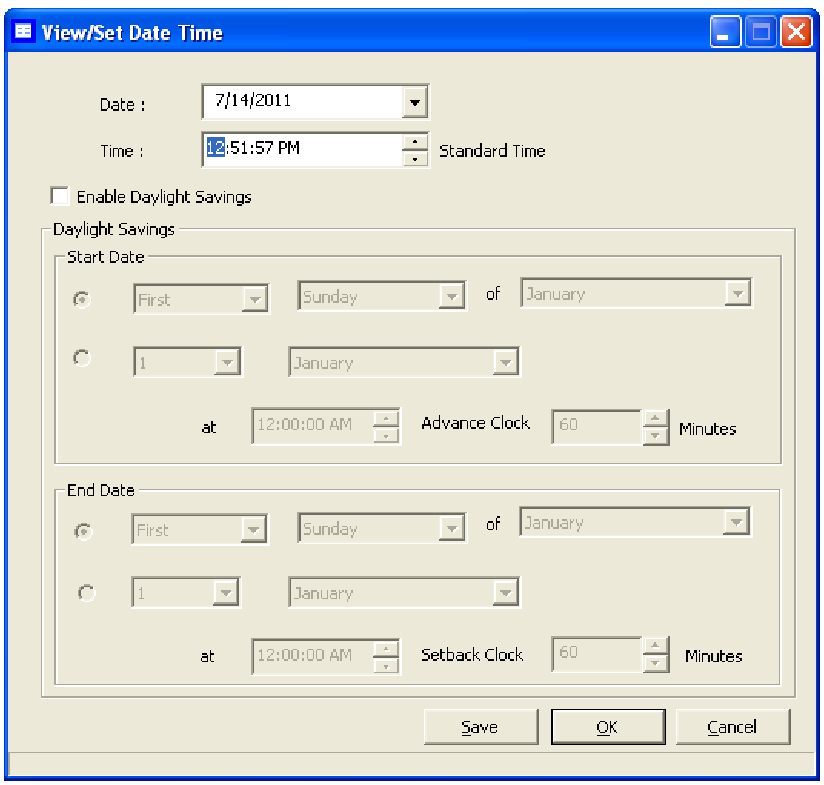
2.6.1 Adjusting daylight savings

Daylight savings time is the practice of temporarily advancing clocks so that afternoons have more daylight and mornings have less. Typically clocks are adjusted forward one hour near the start of spring and are adjusted backward in autumn. Since the use of daylight savings time is not universal, you have the option of enabling or disabling it in MON 20/20.

To configure MON 20/20 to use daylight savings time, do the following:

1. Select **View/Set Date Time...** from the **Chromatograph** menu. The *View/Set Date Time* window displays.

Figure 2-32. The View/Set Date Time window

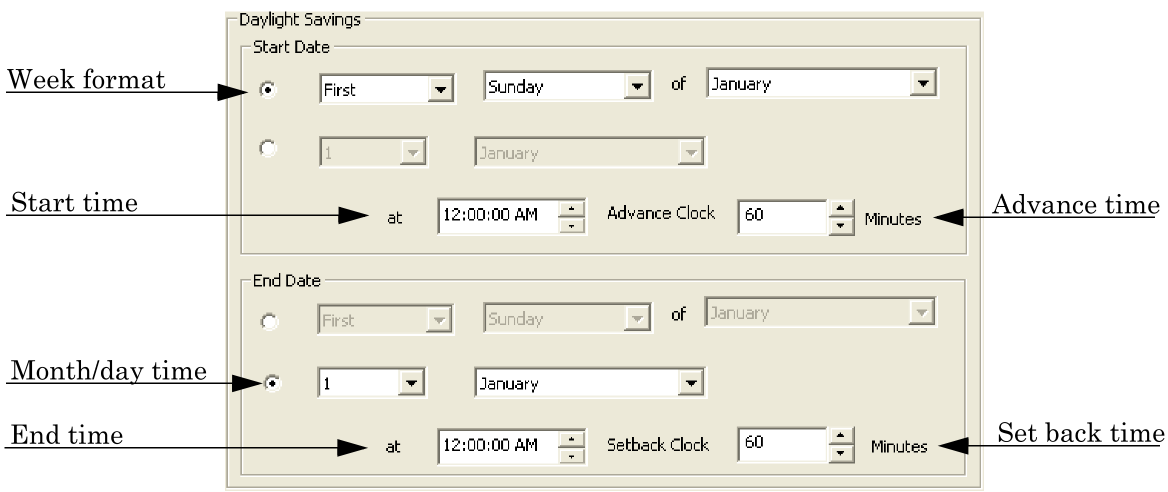


Note
Make sure the GC is set to the current date and time before enabling the daylight savings feature.

2. Click the **Enable Daylight Savings** checkbox. The *Daylight Savings* section will be enabled, giving you the following two options for setting the start and end times for daylight savings:
   - Week format. You can specify on which week day, of what week, and of what month DST to start and end.
   - Month/Day format. You can specify the exact day of the month and the month number for which you want daylight savings to start and end.

Note
These formats can be used interchangeably; for example, the Week format can be used to specify the start date, and the Month/Day format can be used to specify the end date.

Figure 2-33. The Daylight Savings options

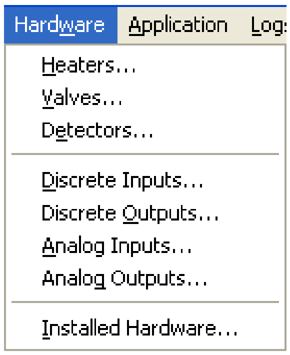


3. Set the start date for daylight savings time.
4. Set the start time and the advance time.

5. Set the end date for daylight savings time.
6. Set the end time and the setback time.
7. To implement your changes without closing the *View/Set Date Time* window, click **Save**. To implement your changes and close the *View/Set Date Time* window, click **OK**.

Note
Daylight savings time should be configured each time the feature is enabled; thereafter, each year MON 20/20 will automatically compute the start and end times based on the initial configuration.

Section 3: Using the hardware functions



Many of a gas chromatograph's hardware components—such as its heaters, valves, and discrete outputs—can be easily managed through MON 20/20.

This chapter shows you how to view and administer each of a gas chromatograph's major hardware components.

This chapter also shows you how to view an inventory of all of a gas chromatograph's installed hardware components.

3.1 Controlling the temperature of the gas chromatograph's heaters

By selecting **Heaters...** from the **Hardware** menu, you can set a heater's desired temperature or fix its power output.

Each heater can be set to one of the following modes:

- **Auto** - Allows you to set the desired tempature for the heater.
- **Fixed On** - Allows you to set the power output for the heater without regard to temperature.
- **Not Used** - Removes the heater from service.

Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

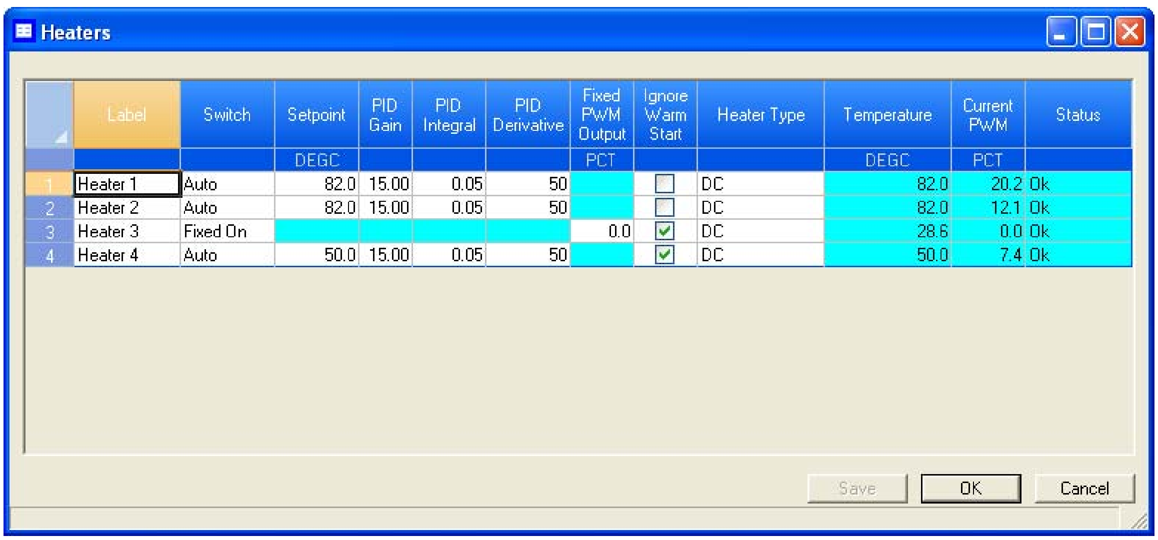
Note
Typically, **Heater 1** is the "high hat" heater, and **Heater 2** is the column heater.

3.1.1 Renaming a heater

To assign an identifying label to a heater, do the following:

1. Select **Heaters...** from the **Hardware** menu. The *Heaters* window displays.

Figure 3-1. The Heaters window



	Label	Switch	Setpoint	PID Gain	PID Integral	PID Derivative	Fixed PWM Output	Ignore Warm Start	Heater Type	Temperature	Current PWM	Status
			DEGC				PCT			DEGC	PCT	
1	Heater 1	Auto	82.0	15.00	0.05	50		☐	DC	82.0	20.2	Ok
2	Heater 2	Auto	82.0	15.00	0.05	50		☐	DC	82.0	12.1	Ok
3	Heater 3	Fixed On					0.0	☑	DC	28.6	0.0	Ok
4	Heater 4	Auto	50.0	15.00	0.05	50		☑	DC	50.0	7.4	Ok

2. Double-click on the appropriate row under the *Label* column for the heater that you want to name.

Note
The heaters are labelled **Heater 1** - **Heater** *N* by default, where *N* equals the total number of heaters available to the GC.

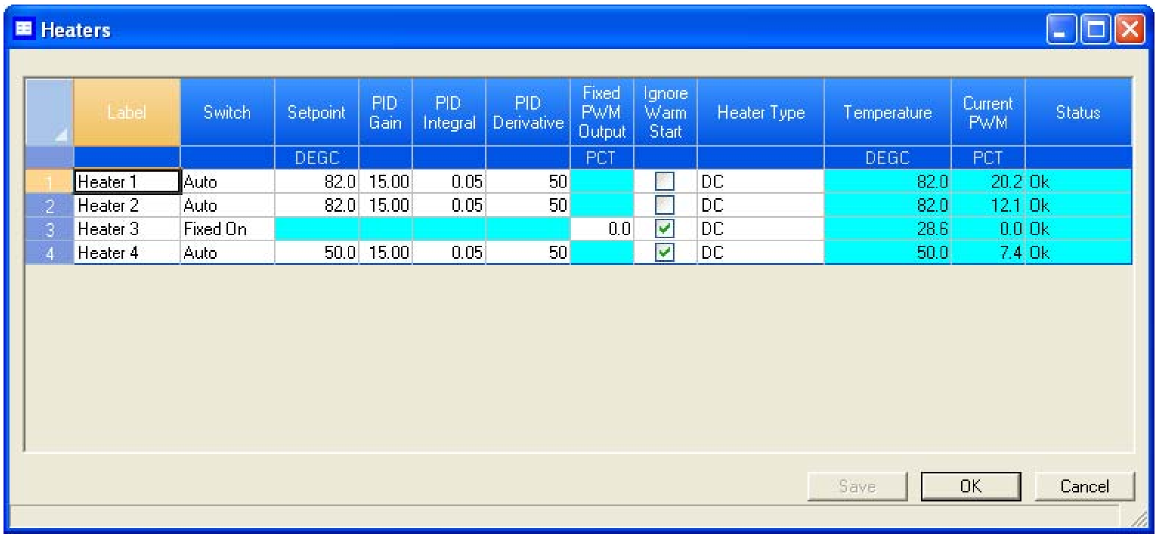
3. Type in a descriptive name for the heater. This name must be unique; two heaters cannot share the same label.
4. Click **OK**.

3.1.2 Setting the heater's type

To set a heater's type, do the following:

1. Select **Heaters...** from the **Hardware** menu.

Figure 3-2. The Heaters window

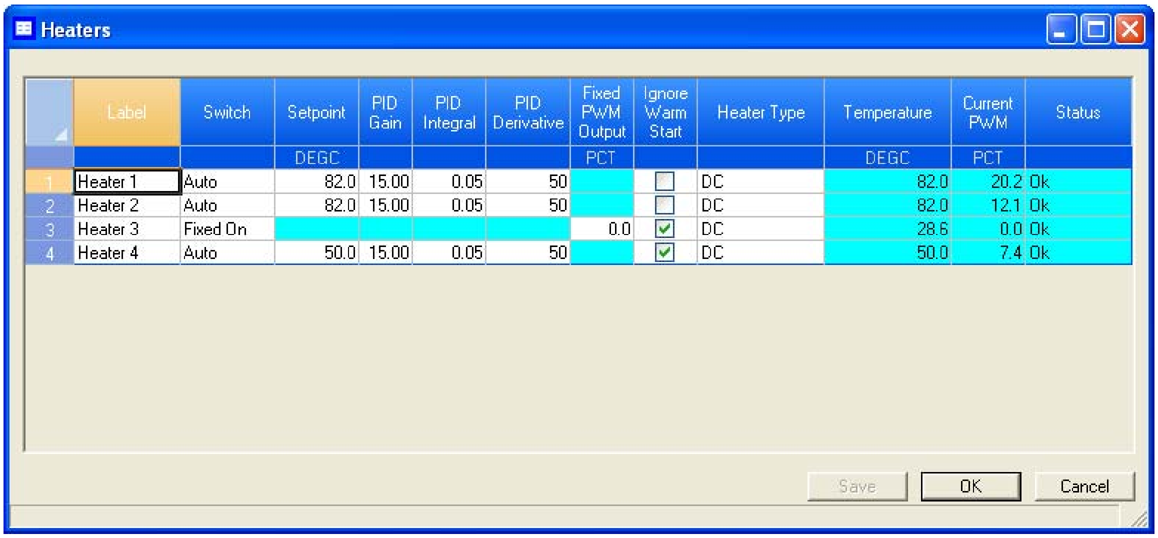


2. Click on the appropriate *Heater Type* cell and select **AC** or **DC** from the drop-down list.
3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

3.1.3 Monitoring the temperature of a heater

To check a heater's temperature, select **Heaters...** from the **Hardware** menu.

Figure 3-3. The Heaters window

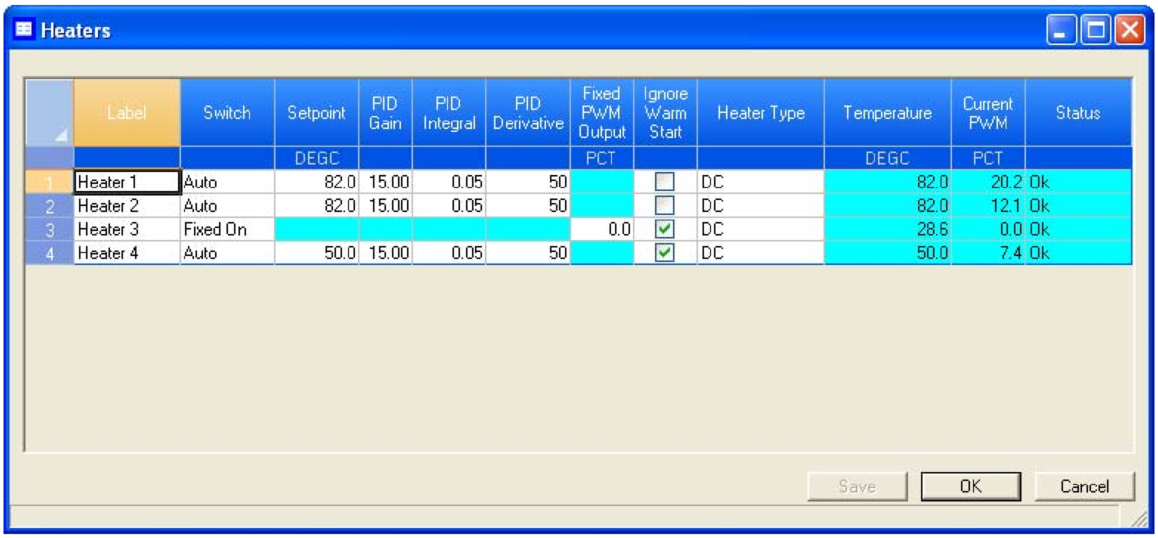


The current temperature of each heater displays under the *Temperature* column, and updates in real time. The percentage of the GC's power output that is being used by each heater displays under the *Current PWM* column.

3.1.4 Monitoring the operational status of a heater

To check a heater's status, select **Heaters...** from the **Hardware** menu.

Figure 3-4. The Heaters window



	Label	Switch	Setpoint	PID Gain	PID Integral	PID Derivative	Fixed PWM Output	Ignore Warm Start	Heater Type	Temperature	Current PWM	Status
			DEGC				PCT			DEGC	PCT	
1	Heater 1	Auto	82.0	15.00	0.05	50		[ ]	DC	82.0	20.2	Ok
2	Heater 2	Auto	82.0	15.00	0.05	50		[ ]	DC	82.0	12.1	Ok
3	Heater 3	Fixed On					0.0	[x]	DC	28.6	0.0	Ok
4	Heater 4	Auto	50.0	15.00	0.05	50		[x]	DC	50.0	7.4	Ok

The status of each heater displays under the *Status* column. There are four possible status states, and their meanings are as follows:

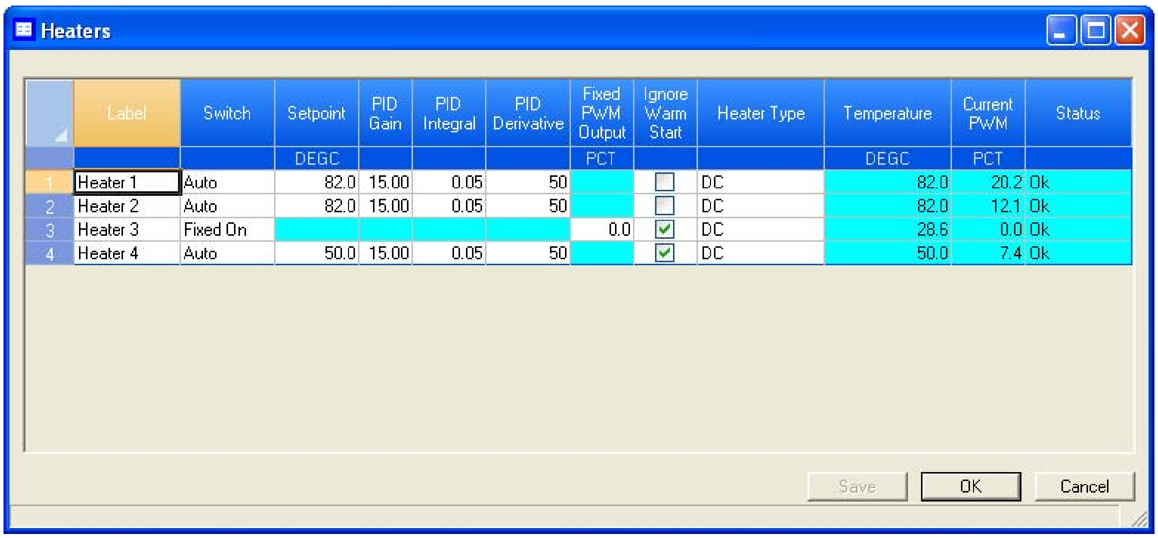
OK	The heater's control card is installed and is working correctly.
Not Installed	The heater's control card is not installed.
Out of Control	The heater is running and is in the process of reaching its temperature set point.
Error	The GC cannot communicate with the heater.

3.1.5 Setting the desired temperature

To set the desired temperature for a heater, do the following:

1. Select **Heaters...** from the **Hardware** menu. The *Heaters* window displays.

Figure 3-5. The Heaters window



2. For each heater that you want to set, select **Auto** from the appropriate row under the *Switch* column.
3. For each heater that you want to set, double-click on the appropriate row under the *Setpoint* column, and enter the desired temperature, in degrees Celsius. You can enter a value between **20** and **500**.
4. To exclude a heater from the Warm Start process, select its *Ignore Warm Start* check box.

Note
A *warm start* occurs when the GC restarts after having been shut down during an auto sequence analysis run. The GC will activate the heaters and wait until they reach their setpoints and the temperature stabilizes; the GC will then resume the auto sequence run.

5. The appropriate rows under the *PID Gain*, *PID Integral*, and *PID Derivative* columns can also be edited by double-clicking and entering a new value. The value ranges for each column is as follows:

PID Gain	0 - 500
PID Integral	0 - 500
PID Derivative	0 - 50000

6. To save the changes and leave the window open so that you can monitor the heaters' status, click **Save**. The current temperature of each heater displays in the *Temperature* column, and is updated in real time.

7. To save the changes and close the window, click **OK**.

3.1.6 Setting PWM Output

Note
Pulse-Width Modulation (PWM) is a technique for providing intermediate amounts of electrical power between fully on and fully off.

A heater needs voltage to operate. The amount of voltage that is delivered to a heater can be controlled manually when the heater is set to **Fixed On** mode. Setting a heater to **Fixed On** mode can be useful when troubleshooting heater issues.

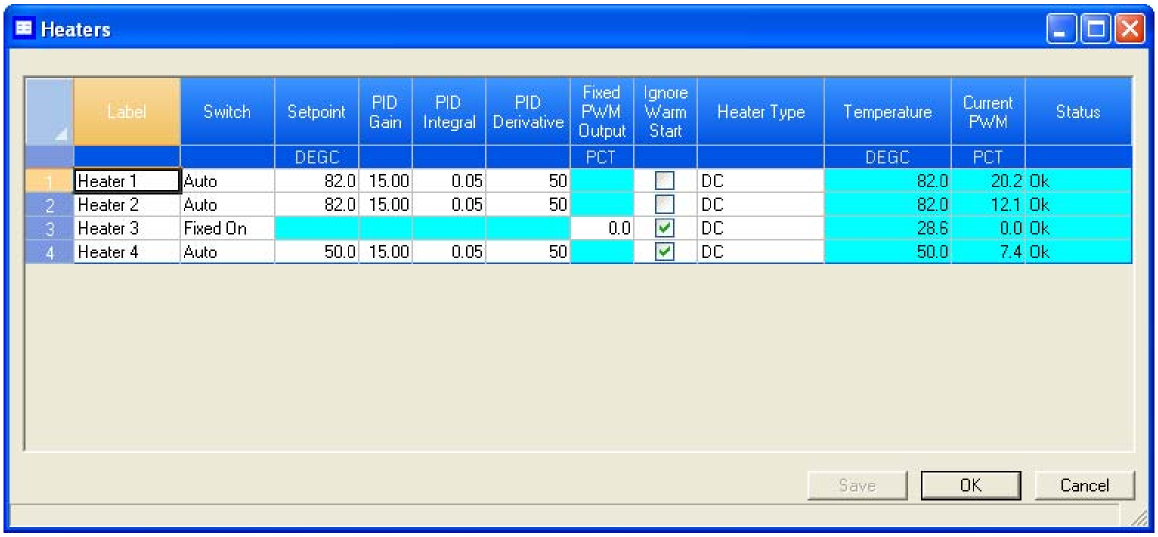
CAUTION

Fixed On mode is not recommended for general GC operations. Switching a heater to Fixed On mode removes its ability to maintain a constant temperature because the power delivered to the heater will not fluctuate based on the temperature setpoint, but will instead remain at the level set by the user.

To set a heater's PWM Output, do the following:

1. Select **Heaters...** from the **Hardware** menu. The *Heaters* window displays.

Figure 3-6. The Heaters window



	Label	Switch	Setpoint	PID Gain	PID Integral	PID Derivative	Fixed PWM Output	Ignore Warm Start	Heater Type	Temperature	Current PWM	Status
			DEGC				PCT			DEGC	PCT	
1	Heater 1	Auto	82.0	15.00	0.05	50		☐	DC	82.0	20.2	Ok
2	Heater 2	Auto	82.0	15.00	0.05	50		☐	DC	82.0	12.1	Ok
3	Heater 3	Fixed On					0.0	☑	DC	28.6	0.0	Ok
4	Heater 4	Auto	50.0	15.00	0.05	50		☑	DC	50.0	7.4	Ok

2. For each heater that you want to set, select **Fixed On** from the appropriate row under the *Switch* column.
3. For each heater that you want to set, double-click on the appropriate row under the *Fixed PWM Output* column, and enter the desired percentage of output. You can enter a decimal value between **0** and **100**.

CAUTION

It is not recommended that a value of 95 or higher be used for a prolonged time, as this may damage the equipment.

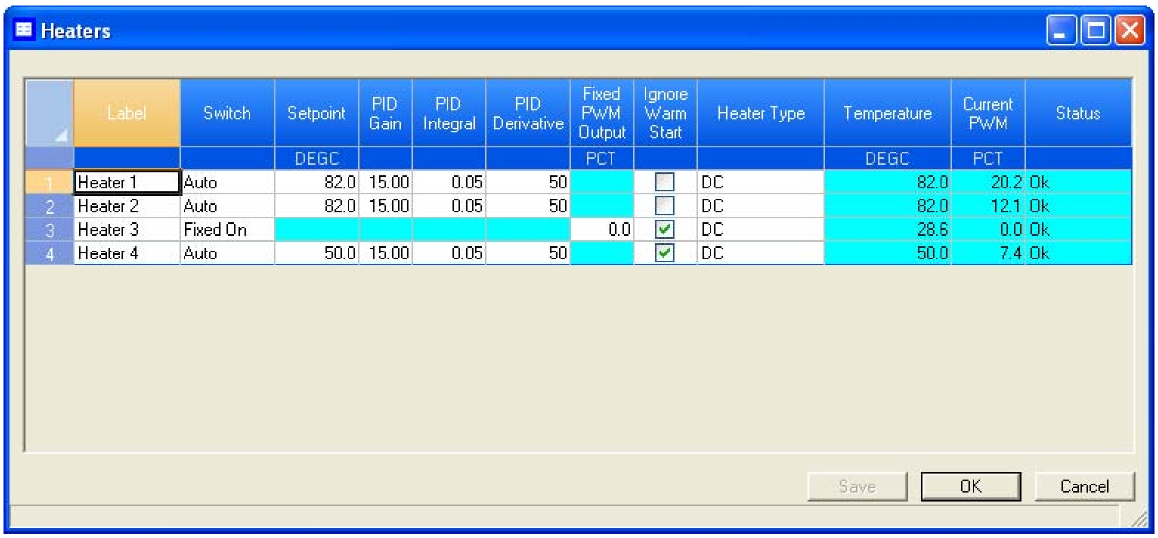
4. To save the changes and leave the window open so that you can monitor the heaters' status, click **Save**. The current temperature of each heater displays in the *Temperature* column, and is updated in real time.
5. To save the changes and close the window, click **OK**.

3.1.7 Removing a heater from service

To remove a heater from service, do the following:

1. Select **Heaters...** from the **Hardware** menu. The *Heaters* window displays.

Figure 3-7. The Heaters window



2. For each heater that you want to set, select **Not Used** from the appropriate row under the *Switch* column. The row turns turqoise, indicating that it is no longer in service.
3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

3.2 Configuring the valves

MON 20/20 allows you to do the following from the *Valves* window:

- Assign identifying labels to each valve.
- Monitor valve operation.
- Control the operation modes for each valve.

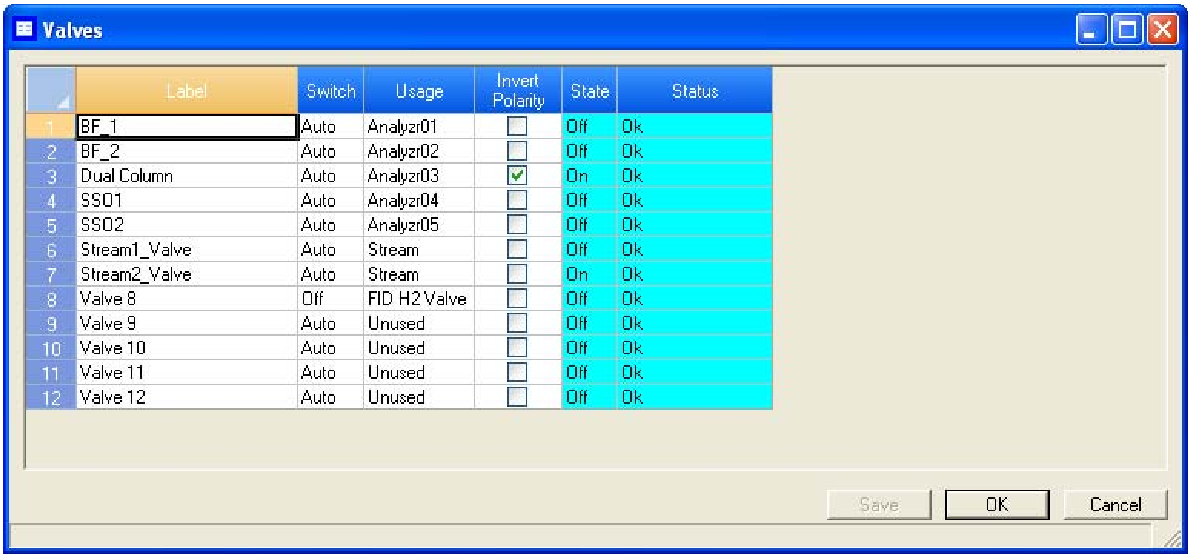
Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

3.2.1 Renaming a valve

Give each valve a descriptive label to avoid confusing one valve for another. To assign an identifying label, do the following:

1. Select **Valves...** from the **Hardware** menu. The *Valves* window displays.

Figure 3-8. The Valves window with Physical Name column


Valves

	Label	Switch	Usage	Invert Polarity	State	Status
1	BF_1	Auto	Analyzr01	☐	Off	Ok
2	BF_2	Auto	Analyzr02	☐	Off	Ok
3	Dual Column	Auto	Analyzr03	☑	On	Ok
4	SS01	Auto	Analyzr04	☐	Off	Ok
5	SS02	Auto	Analyzr05	☐	Off	Ok
6	Stream1_Valve	Auto	Stream	☐	Off	Ok
7	Stream2_Valve	Auto	Stream	☐	On	Ok
8	Valve 8	Off	FID H2 Valve	☐	Off	Ok
9	Valve 9	Auto	Unused	☐	Off	Ok
10	Valve 10	Auto	Unused	☐	Off	Ok
11	Valve 11	Auto	Unused	☐	Off	Ok
12	Valve 12	Auto	Unused	☐	Off	Ok

Save OK Cancel

2. Double-click on the appropriate row under the *Label* column for the valve that you want to name.

Note
The valves are labelled **Valve 1** - **Valve** *N* by default, where *N* equals the total number of valves available to the GC.

3. Type in a new descriptive name for the valve.
4. Click **OK**.

3.2.2 Setting a valve's operational mode

A valve has three operational modes: **Auto**, **On**, and **Off**.

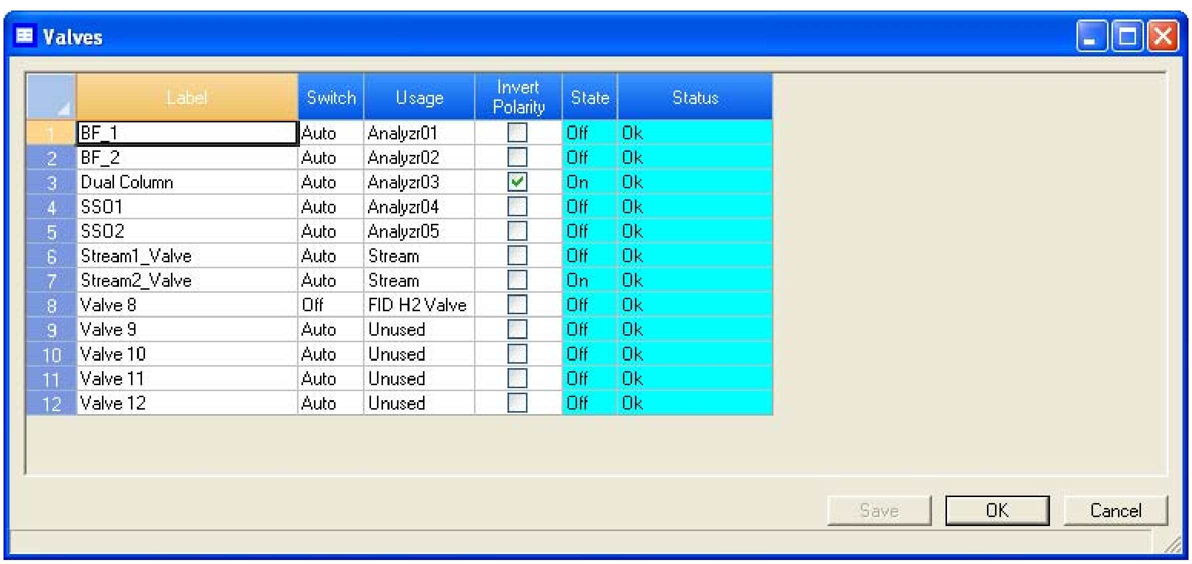
- Setting the valve to **Off** means that the valve will turn off and remain off until the operational mode is changed.
- Setting the valve to **Auto** means that the valve will turn on and off according to the Timed Events table.
- Setting the valve to **On** means that the valve will turn on and remain on until the operational mode is changed.

Note
The GC's switch panel valve settings override MON 20/20's valve settings.

To set a valve's operational mode, do the following:

1. Select **Valves...** from the **Hardware** menu. The *Valves* window displays.

Figure 3-9. The Valves window

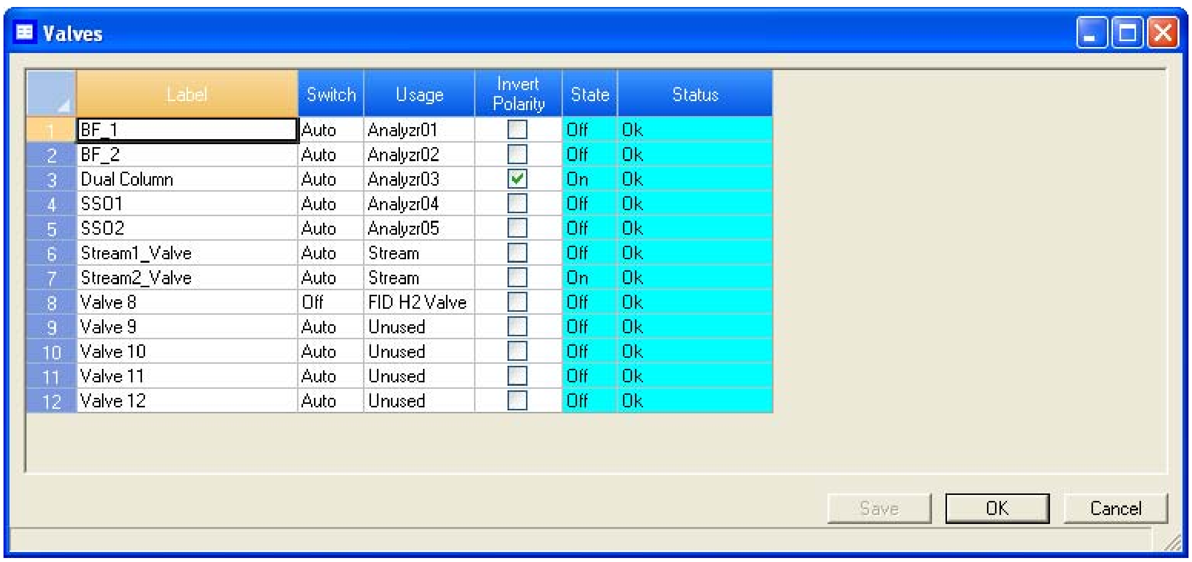


2. Select the desired mode from the drop-down menu under the *Switch* cloumn for the valve.
3. To save the changes and leave the window open so that you can monitor the valve's progress, click **Save**. The current state of the valve displays in the *State* column, and is updated in real time.
4. To save the changes and close the window, click **OK**.

3.2.3 Monitoring the operational status of a valve

To check a valve's status, select **Valves...** from the **Hardware** menu.

Figure 3-10. The Valves window



The status of each valve displays under the *Status* column. There are five possible status readings, and their meanings are as follows:

OK	The valve is installed and is working correctly.
Not Installed	The valve is not installed.
Under/Over Current Error	Unable to switch the solenoid on or off. There is a potential problem with the solenoid.
Error	The Heater/Solenoid board is installed but the GC cannot communicate with it.

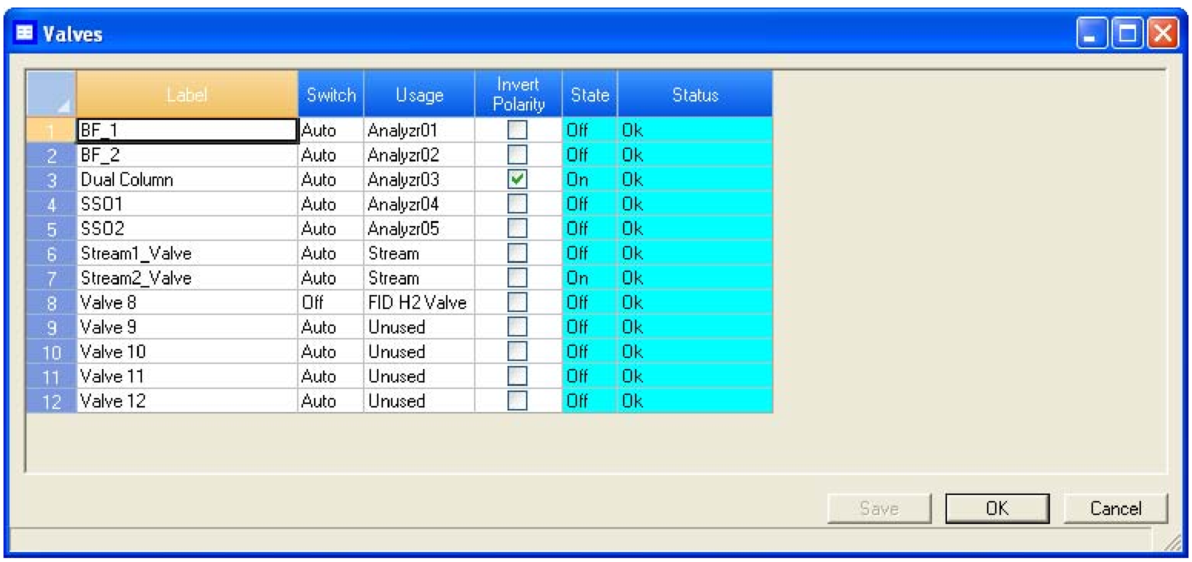
3.2.4 Inverting the polarity of a valve

The **Invert Polariy** option reverses the effect of switching a valve on or off. By default, the **Invert Polarity** option is set to FALSE, which means that switching a valve to ON activates it, and switching the valve to OFF deactivates it. Setting **Invert Polarity** to TRUE means that switching a valve to ON *deactivates* it, and switching the valve to OFF *activates* it.

To set the polarity of a valve, do the following:

1. Select **Valves...** from the **Hardware** menu. The *Valves* window displays.

Figure 3-11. The Valves window



2. If the *Invert Polarity* checkbox is selected, it is set to **True**; to set it to **False**, uncheck the box by clicking it. If the *Invert Polarity* checkbox is not selected, it is set to **False**; to set it to **True**, click the box.

3.2.5 Setting the usage mode for a valve

A valve's usage mode determines its general function, or role, during an analysis run. A valve can be assigned one of the following usage modes:

- DO
- FID H2 Valve
- Common Alarm
- Stream
- Analyzer01

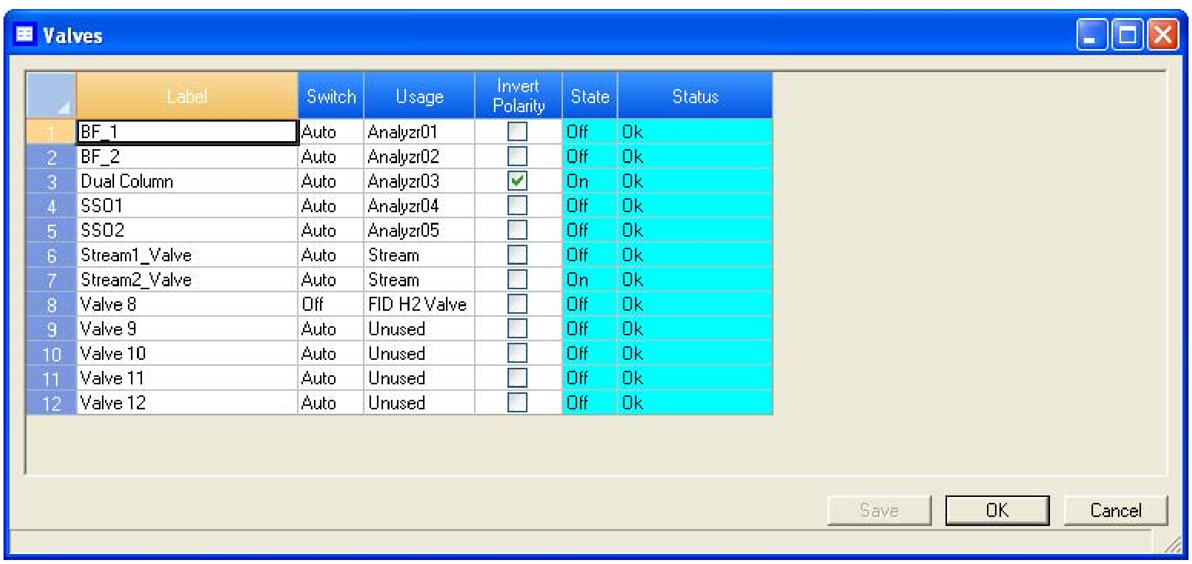
  ...

- Analyzer016

To set the usage mode for a valve, do the following:

1. Select **Valves...** from the **Hardware** menu. The *Valves* window displays.

Figure 3-12. The Valves window



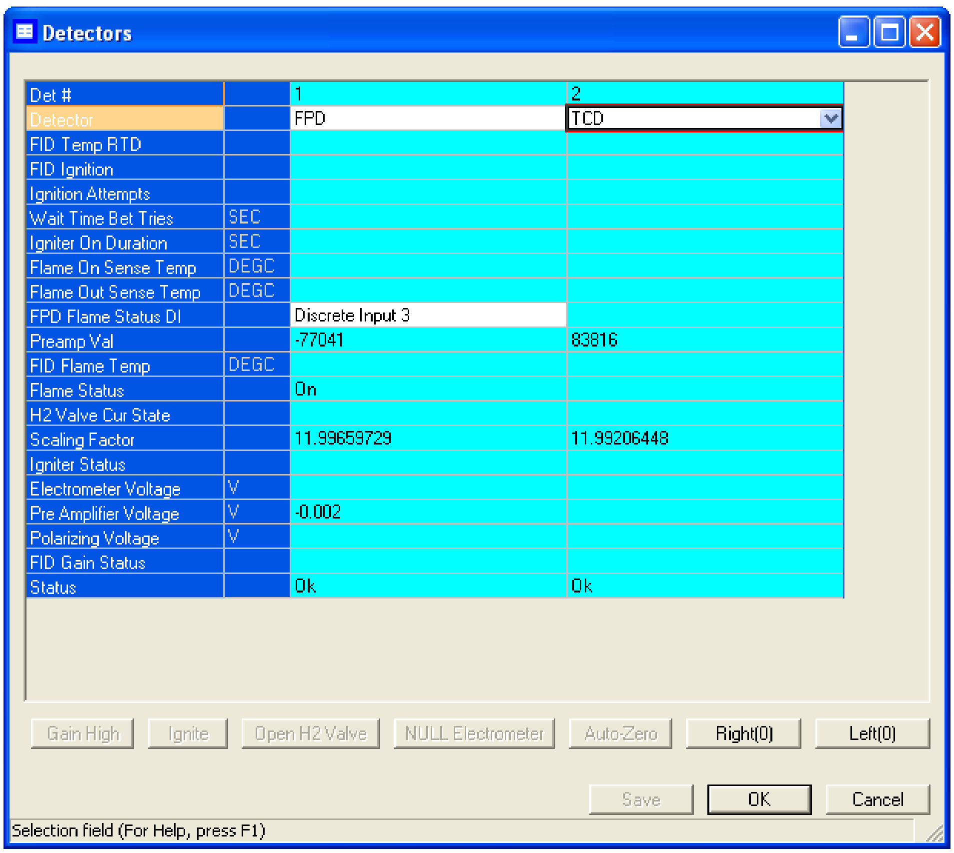
2. Select the desired mode from the drop-down menu under the *Usage* cloumn for the valve.
3. To save the changes and leave the window open so that you can monitor the valve's progress, click **Save**. The current state of the valve displays in the *State* column, and is updated in real time.
4. To save the changes and close the window, click **OK**.

3.3 Controlling the detectors

Use the *Detectors* window to monitor the activity and status of the GC's detectors.

To view the *Detectors* window, select **Detectors...** from the **Hardware** menu.

Figure 3-13. The Detectors window showing a TCD and an FID



Note
Before making any modifications to this window, halt the analysis. See "Halting an analysis" on page 6-1 for more information.

Note
Blue cells display read-only data; white cells display editable data.

The following data displays for each detector:

Name	Description
Det #	Numerical identifier for the detector to which the following data applies.
Detector	Options, which depend on your GC's configuration, are **TCD**, **FPD**, or **FID**.
FID Temp RTD	Applies to FIDs only. Select the appropriate RTD from the drop-down list. The RTD measures the temperature of the FID flame.
FID Ignition	Applies to FIDs only. Select **Manual** if you want to control the ignition of the FID; select **Auto** if you want the GC to control the ignition of the FID.
Ignition Attempts	Applies to FIDs only. Indicates the number of times the GC will try to light the flame. If an 'Auto' FID ignition sequence fails to light the flame after the specified number of attempts, the GC will close the hydrogen valve, switch the FID ignition parameter to Manual, and set an active alarm.
Wait Time Bet Tries	Applies to FIDs only. Indicates the amount of time, in seconds, the GC will wait between ignition attempts.
Igniter On Duration	Applies to FIDs only. Indicates the length of time that the igniter will remain on.
Flame On Sense Temp	Applies to FIDs only. The flame ignites when the FID internal temperature exceeds the value set in this field.
Flame Out Sense Temp	Applies to FIDs only. The flame is extinguished when the FID internal temperature falls below the value set in this field.
FPD Flame Status DI	Applies to FPDs only. Allows you to select from a list of available digital inputs. The digital input that is selected will receive the FPD's flame status value.
Preamp Val	FID count. Read-only. See "Resetting the preamp value" on page 3-22 for more information.
FID Flame Temp	Temperature of the FID flame as read by the RTD. Read-only.
Flame Status	Options are: **Off**, **On**, and **Over Temperature**. Read-only.
H2 Valve Cur State	Options are: **Open** and **Closed**. Read-only.
Scaling Factor	Preamp calibration factor.
Igniter Status	Options are: **Off** and **On**. Read-only.
Electrometer Voltage	Output at first stage of FID preamp. Read-only.

Name	Description
Pre Amplifier Voltage	Output at second stage of FID preamp. Read-only.
Polarizing Voltage	Igniter voltage. Read-only.
FID Gain Status	Options are: **Low** and **High**.
Status	Options are: **Ok**, **Not Installed** and **Internal Error**. Read-only.

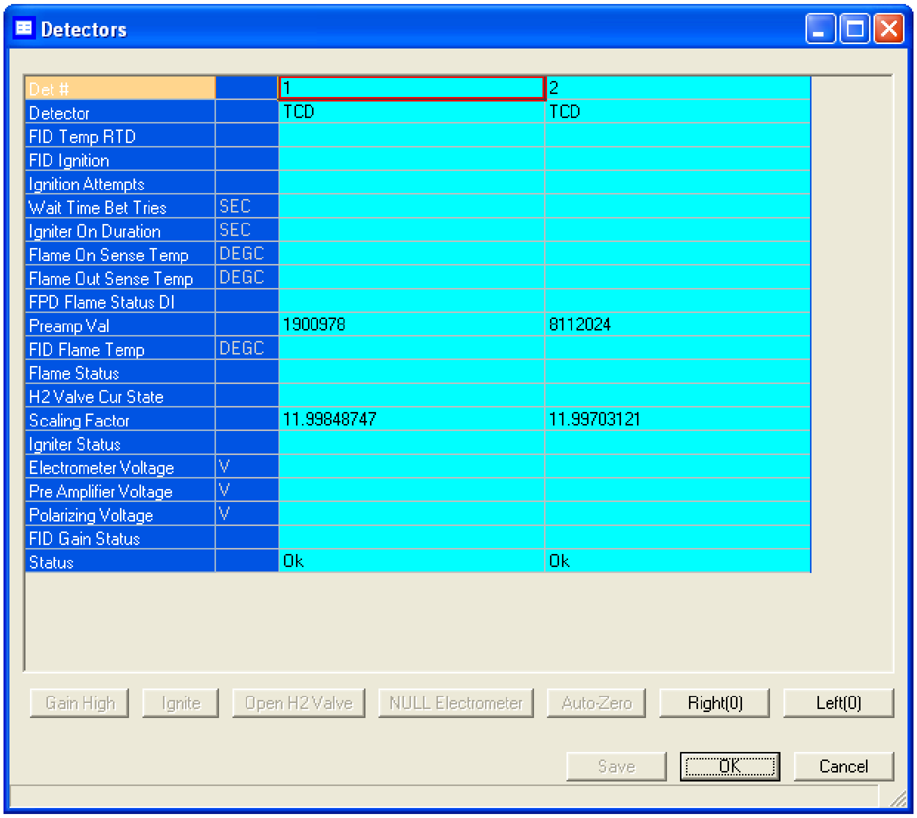
3.3.1 Offsetting the baseline

In some situations that involve TCD detectors the baseline may be displayed either too high on the graph, in which case the tops of the peaks are cut off, or too low on the graph, so that the bases of the peaks are cut off. If this occurs it is possible to offset the baseline either up or down so that the entire peak can be displayed on the graph. This offset will be applied to all traces—live, archived and saved—that are displayed thereafter.

To offset the baseline, do the following:

1. Select **Detectors...** from the **Hardware** menu. The *Detectors* window displays.

Figure 3-14. The Detectors window



2. Select the appropriate detector. It may be necessary to return to the Chromatogram Viewer to learn which detector is the source of the trace that needs to be offset.

3. To *lower* the baseline, click **Left(*N*)**. Each time this button is clicked, N is incremented by -1. For example, is this is the first time the button has been clicked, Left(0) will be increment to Left(-1) and the baseline will be lowered one step. If Right(*N*) was clicked previously, then that button will be incremented by -1 first, until it reached Right(0); at the point, Left(*N*) will be incremented by -1.

Note
To reset the baseline to its default setting, click Right(*N*) and Left(*N*) until they read Right(0) and Left(0).

4. To *raise* the baseline, click **Right(*N*)**. Each time this button is clicked, N is incremented by 1. For example, is this is the first time the button has been clicked, Right(0) will be increment to Right(1) and the baseline will be raised one step. If Left(*N*) was clicked previously, then that button will be incremented by 1 first, until it reaches Left(0); at the point, Right(*N*) will be incremented by 1.

Note
To reset the baseline to its default setting, click Right(*N*) and Left(*N*) until they read Right(0) and Left(0).

---

5. After the baseline has been raised or lowered to your satisfaction, click **OK**.

3.3.2 Igniting the FID flame

If the *FID Ignition* field on the *Detectors* window is set to “Manual” and if the *Flame status* field is set to “Off”, do the following to restart the flame:

1. Click **Open H2 Valve**. The *H2 Valve Cur State* field changes to “Open”.
2. Click **Ignite**. The *Flame Status* field changes to “On” when the FID internal temperature exceeds the value set in the *Flame On Sense Temp* field.

Note
If the *FID Ignition* field is set to “Auto”, the GC will automatically restart the flame if it goes out.

3.3.3 Resetting the preamp value

To reset the *Preamp Val* field on the *Detectors* window to 0, click **Auto-Zero**.

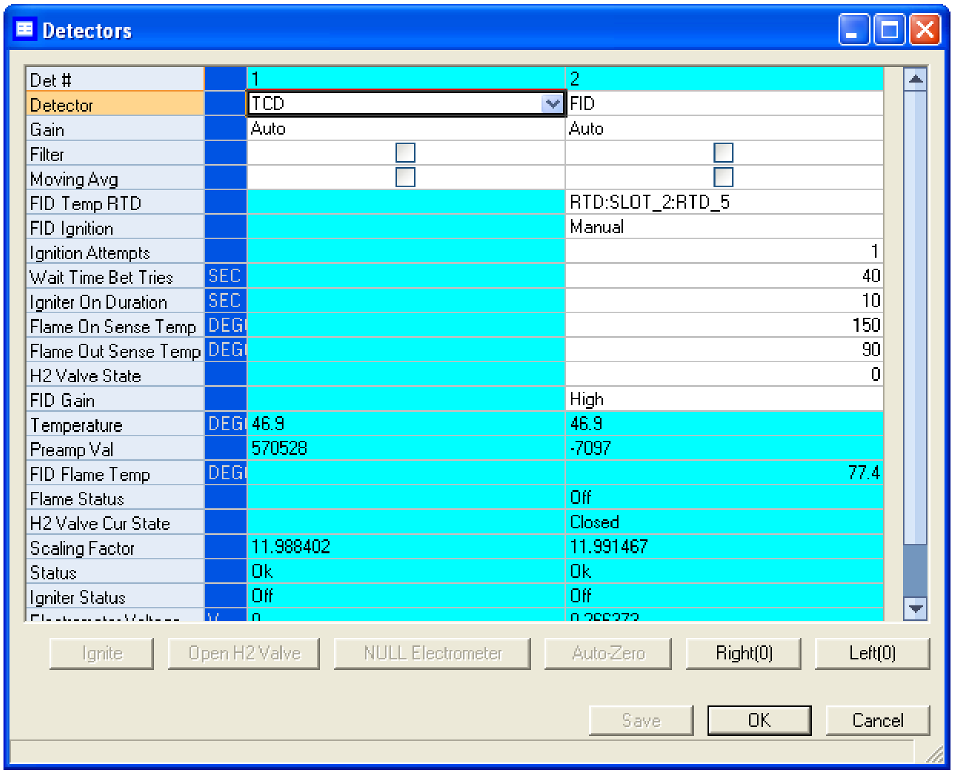
3.3.4 Balancing the preamp

In some situations that involve TCD detectors the baseline may be displayed either too high on the graph, in which case the tops of the peaks are cut off, or too low on the graph, so that the bases of the peaks are cut off. If this occurs it is possible to offset the baseline either up or down so that the entire peak can be displayed on the graph. This offset will be applied to all traces—live, archived and saved—that are displayed thereafter.

To offset the baseline, do the following:

1. Select **Detectors...** from the **Hardware** menu. The *Detectors* window displays.

Figure 3-15. The Detectors window



2. Select the appropriate detector. It may be necessary to return to the Chromatogram Viewer to learn which detector is the source of the trace that needs to be offset.

3. To *lower* the baseline, click **Left(*N*)**. Each time this button is clicked, N is incremented by -1. For example, is this is the first time the button has been clicked, Left(0) will be increment to Left(-1) and the baseline will be lowered one step. If Right(*N*) was clicked previously, then that button will be incremented by -1 first, until it reached Right(0); at the point, Left(*N*) will be incremented by -1.

Note
To reset the baseline to its original setting, click Right(N) and Left(N) until they read Right(0) and Left(0).

4. To *raise* the baseline, click **Right(*N*)**. Each time this button is clicked, N is incremented by 1. For example, is this is the first time the button has been clicked, Right(0) will be increment to Right(1) and the baseline will be raised one step. If Left(*N*) was clicked previously, then that button will be incremented by 1 first, until it reaches Left(0); at the point, Right(*N*) will be incremented by 1.

Note
To reset the baseline to its original setting, click Right(N) and Left(N) until they read Right(0) and Left(0).

3.4 Managing your gas chromatograph's discrete inputs

You can use MON 20/20 to assign labels to the GC's discrete inputs and to control the discrete inputs' operational modes. The number of discrete inputs available depends on the GC.

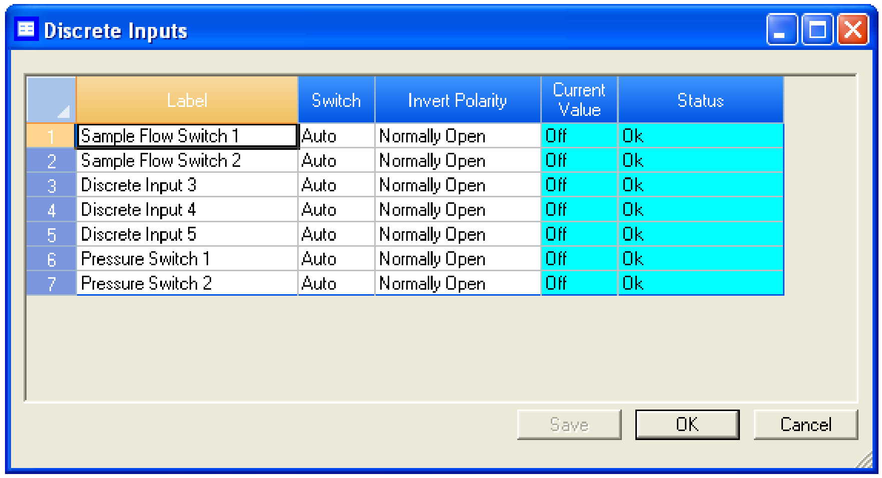
Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

3.4.1 Renaming a discrete input

Give each discrete input a descriptive label to avoid confusing one unit for another. To assign an identifying label, do the following:

1. Select **Discrete Inputs...** from the **Hardware** menu. The *Discrete Inputs* window displays.

Figure 3-16. The Discrete Inputs window



2. Double-click on the appropriate row under the *Label* column for the discrete input that you want to rename.

Note
The discrete inputs are labelled **Discrete Input 1** - **Discrete Input** *N* by default, where *N* equals the total number of discrete inputs available to the GC.

3. Type in a new descriptive name for the discrete input.
4. Click **OK**.

3.4.2 Setting a discrete input's operational mode

A discrete input has three operational modes: **Auto**, **On**, and **Off**.

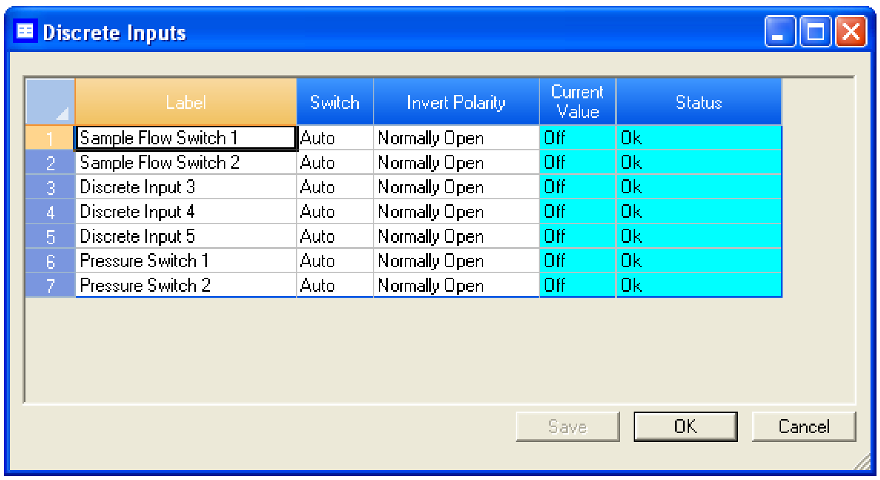
- Setting the discrete input to **Off** means that it will interpret all incoming signals as OFF, despite the true nature of the signal.
- Setting the discrete input to **Auto** means that it will analyze the incoming signal to determine whether it is ON or OFF.
- Setting the discrete input to **On** means that it will interpret all incoming signals as ON, despite the true nature of the signal.

Note
The GC's switch panel settings override MON 20/20's settings.

To set a discrete input's operational mode, do the following:

1. Select **Discrete Input...** from the **Hardware** menu. The **Discrete Input** window displays.

Figure 3-17. The Discrete Inputs window



2. Select the desired mode from the drop-down menu under the *Switch* cloumn for the discrete input.

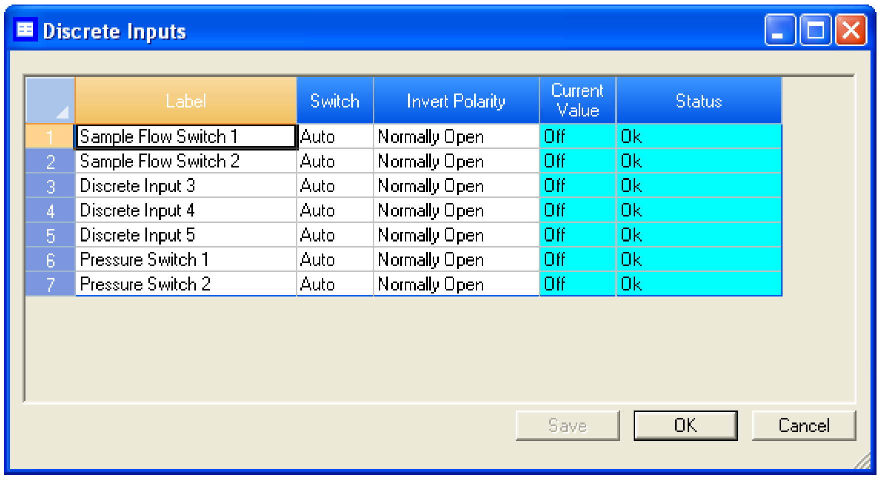
3. To save the changes and leave the window open so that you can monitor the discrete input's progress, click **Save**. The current state of the discrete input displays in the *State* column, and is updated in real time.

4. To save the changes and close the window, click **OK**.

3.4.3 Monitoring the operational status of a discrete input

To check a valve's status, select **Discrete Input...** from the **Hardware** menu.

Figure 3-18. The Discrete Inputs window



The status of each discrete input displays under the *Status* column. There are three possible status readings, and their meanings are as follows:

OK	The discrete input is installed and is working correctly.
Not Installed	The discrete input is not installed.
Error	The Heater/Solenoid board is installed but the GC cannot communicate with it.

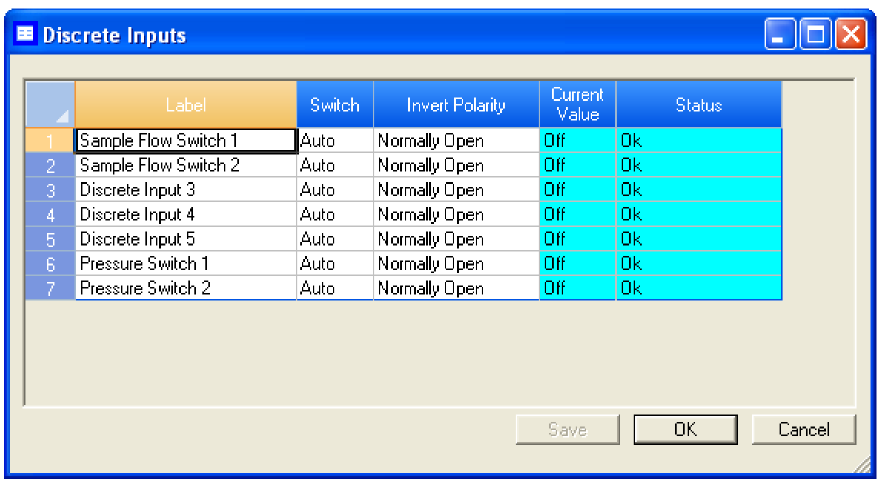
3.4.4 Inverting the polarity of a discrete input

The **Invert Polariy** option reverses the way a voltage signal is interpreted by the discrete input. By default, the **Invert Polarity** option is set to Normally Open, which means that a low voltage signal is interpreted by the discrete input as ON, and a high voltage signal is interpreted by the discrete input as OFF. Setting **Invert Polarity** to Normally Closed means that a low voltage signal is interpreted by the discrete input as OFF, and a high voltage signal is interpreted by the discrete input as ON.

To set the polarity of a discrete input, do the following:

1. Select **Discrete Input...** from the **Hardware** menu. The *Discrete Inputs* window displays.

Figure 3-19. The Discrete Inputs window



2. Select **Normally Open** or **Normally Closed** from the drop-down menu under the *Invert Polarity* cloumn.

3.5 Managing your gas chromatograph's discrete outputs

You can use MON 20/20 to assign labels to the GC's discrete outputs and to control the discrete outputs' operational modes. The number of discrete outputs available depends on the GC.

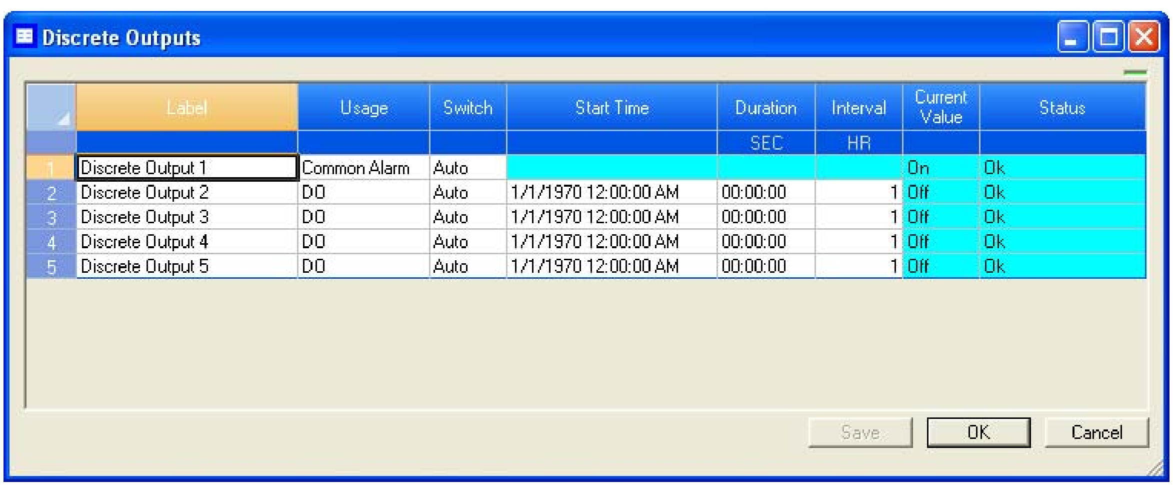
Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

3.5.1 Renaming a discrete output

Give each discrete output a descriptive label to avoid confusing one unit for another. To assign an identifying label, do the following:

1. Select **Discrete Outputs...** from the **Hardware** menu. The *Discrete Outputs* window displays.

Figure 3-20. The Discrete Outputs window



2. Double-click on the appropriate row under the *Label* column for the discrete output that you want to rename.

Note
The discrete outputs are labeled **Discrete Output 1** - **Discrete Output** *N* by default, where *N* equals the total number of discrete outputs available to the GC.

3. Type in a new descriptive name for the discrete output.
4. Click **OK**.

3.5.2 Setting a discrete output's operational mode

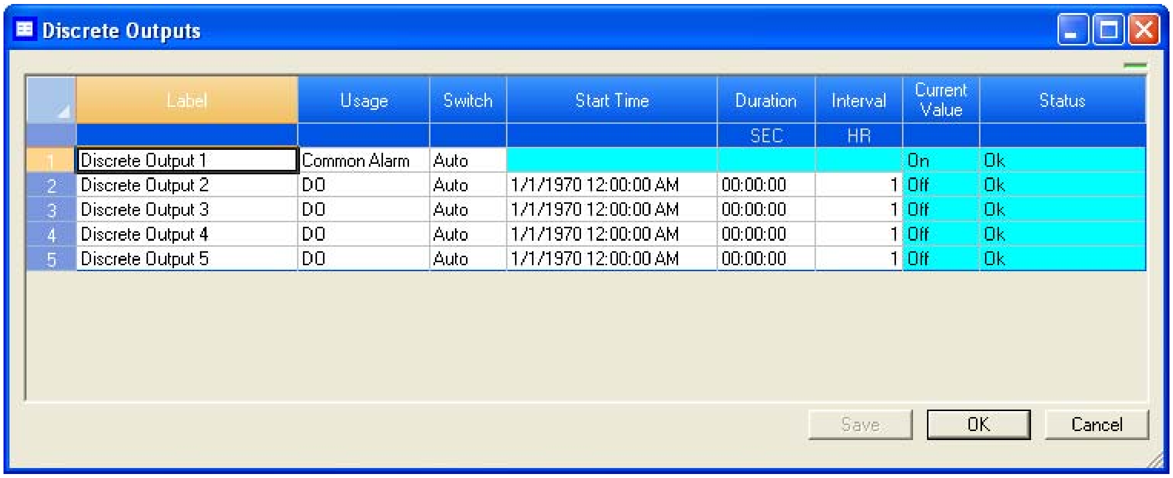
A discrete output has three operational modes: **Auto**, **On**, and **Off**.

- Setting the discrete output to **Off** means that the discrete output will turn off and remain off until the operational mode is changed.
- Setting the discrete output to **Auto** means that the discrete output will turn on and off according to the Timed Events table or the Discrete Outputs table.
- Setting the discrete output to **On** means that the discrete output will turn on and remain on until the operational mode is changed.

To set a discrete output's operational mode, do the following:

1. Select **Discrete Output...** from the **Hardware** menu. The *Discrete Output* window displays.

Figure 3-21. The Discrete Outputs window



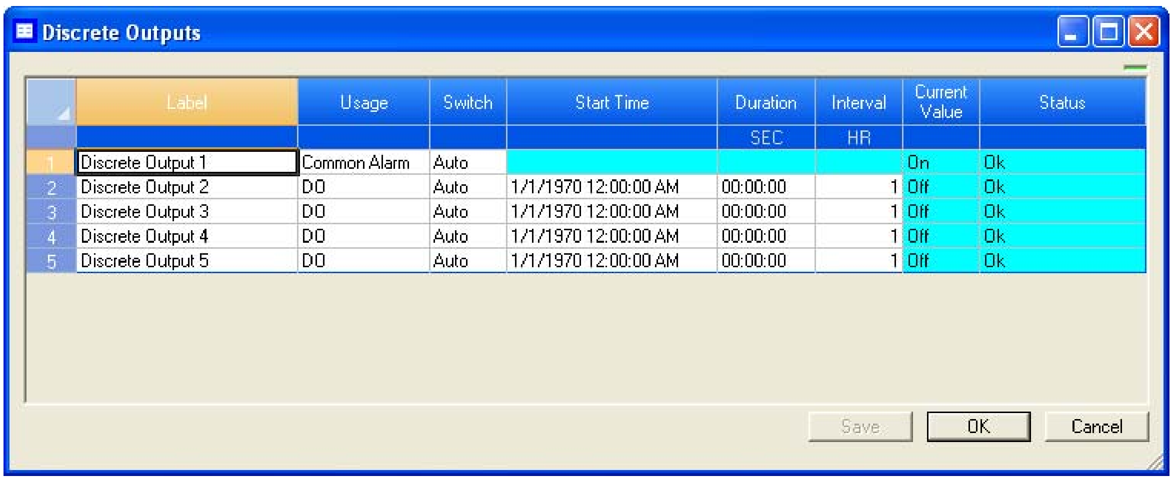
2. Select the desired mode from the drop-down menu under the *Switch* cloumn for the discrete output.

3. To save the changes and leave the window open so that you can monitor the discrete output's progress, click **Save**. To save the changes and close the window, click **OK**. The current state of the discrete output displays in the *State* column, and is updated in real time.

3.5.3 Monitoring the operational status of a discrete output

To check a valve's status, select **Discrete Output...** from the **Hardware** menu.

Figure 3-22. The Discrete Outputs window



The status of each discrete output displays under the *Status* column. There are three possible status readings, and their meanings are as follows:

OK	The discrete output is installed and is working correctly.
Not Installed	The discrete output is not installed.
Error	The Heater/Solenoid board is installed but the GC cannot communicate with it.

3.5.4 Setting the usage mode for a discrete output

A discrete output's usage mode determines which signals are routed to it via the Limited Alarm and Discrete Alarm functions. A discrete output can be assigned one of the following usage modes:

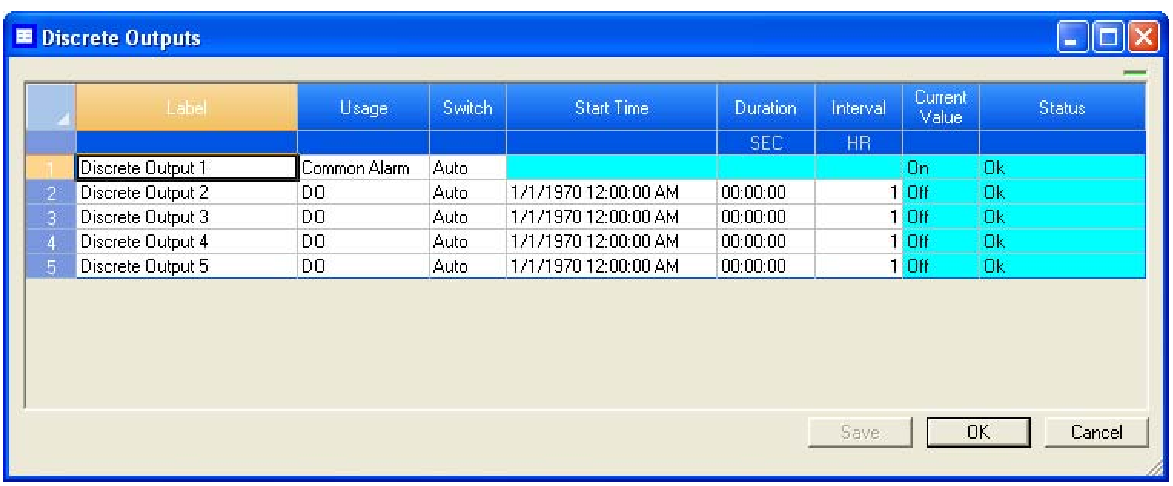
- DO
- FID H2 Valve
- Common Alarm
- Stream
- Analyzer01

  ...
- Analyzer016

To set the usage mode for a discrete output, do the following:

1. Select **Discrete Output...** from the **Hardware** menu. The *Discrete Output* window displays.

Figure 3-23. The Discrete Outputs window



2. Select the desired mode from the drop-down menu under the *Usage* cloumn for the discrete output.
3. If you select **DO** for *Usage*, and **Auto** for *Switch*, then you must also set the *Start Time* and *Duration*. Double-click on the appropriate row under the *Start Time* column and enter the time that the digital output should be turned on. Double-click on the appropriate row under the *Duration* column and enter the amount of time, in seconds, that the digital output should remain on. Double-click on the appropriate row under the *Interval* column and enter the amount of time, in hours, that should pass before the digital output turns on again.
4. To save the changes and leave the window open so that you can monitor the discrete output's progress, click **Save**. To save the changes and close the window, click **OK**. The current statr of the discrete output displays in the *State* column, and is updated in real time.

3.6 Managing your gas chromatograph's analog inputs

With MON 20/20 you can control analog inputs in the following ways:

- Assign identifying labels.
- Assign scale ranges.
- Calibrate analog inputs for zero and full scale values.

Electrical current signals ranging from 4 to 20 mA (±10%) are accepted as analog inputs.

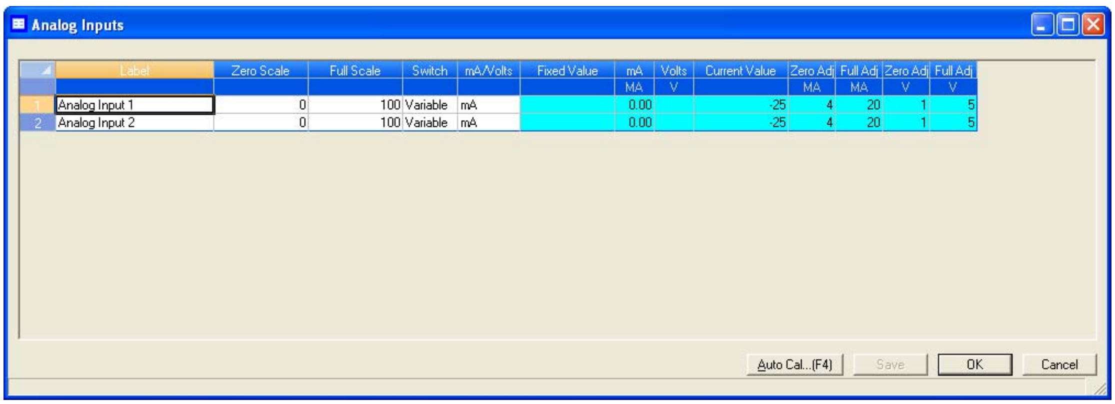
Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

3.6.1 Renaming an analog input

Give each analog input a descriptive label to avoid confusing one unit for another. To assign an identifying label, do the following:

1. Select **Analog Inputs...** from the **Hardware** menu. The *Analog Inputs* window displays.

Figure 3-24. The Analog Inputs window



2. Double-click on the appropriate row under the *Label* column for the analog input that you want to rename.

Note
The analog input devices are labelled Analog Input 1 and Analog Input N by default, where *N* equals the total number of analog inputs available to the GC.

3. Type in a new descriptive name for the analog input.
4. Click **OK**.

3.6.2 Setting a analog input's operational mode

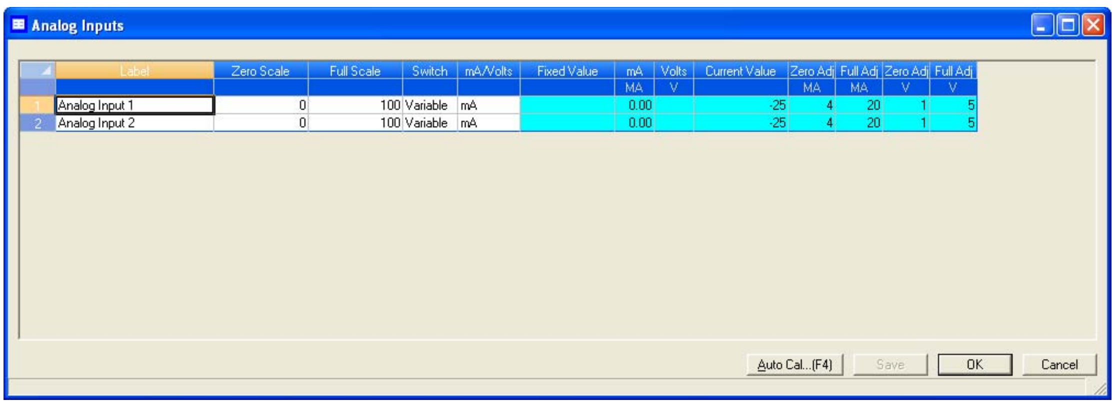
An analog input has two operational modes: **Variable** and **Fixed**.

- Setting the switch to **Variable** means that the analog input will be set automatically, based on the signal it receives.
- Setting the switch to **Fixed** means that the analog input will be set to the value that you enter in the appropriate row under the *Fixed Value* column.

To set an analog input's operational mode, do the following:

1. Select **Analog Input...** from the **Hardware** menu. The *Analog Input* window displays.

Figure 3-25. The Analog Inputs window



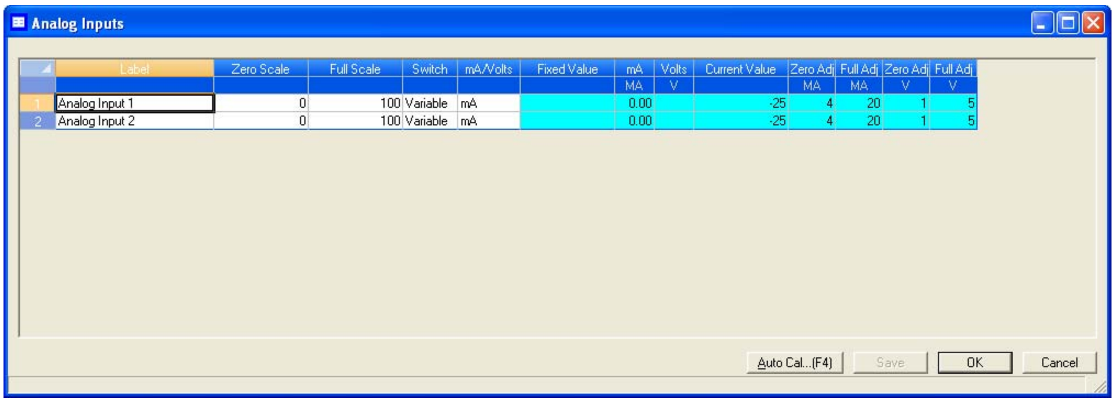
2. Select the desired mode from the drop-down menu under the *Switch* cloumn for the analog input.
3. To save the changes and leave the window open so that you can monitor the analog input, click **Save**. To save the changes and close the window, click **OK**. The current value of the analog input signal displays in the *Current Value* column, and is updated in real time.

3.6.3 Setting the scale values for an analog input device

To set the zero scale and full scale, which are used when converting the analog input value, do the following:

1. Select **Analog Input...** from the **Hardware** menu. The *Analog Input* window displays.

Figure 3-26. The Analog Inputs window



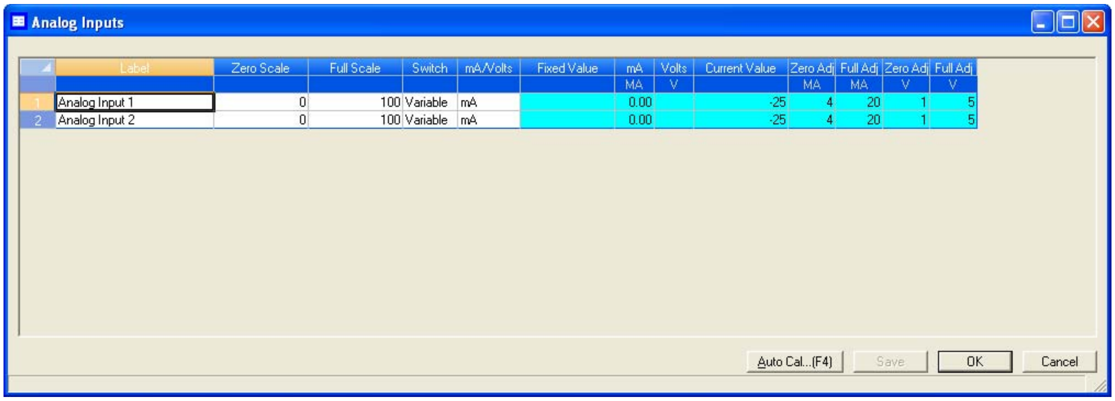
2. Double-click on appropriate row under the *Zero Scale* column and enter a zero scale value.
3. Double-click on appropriate row under the *Full Scale* column and enter a full scale value.
4. To save the changes and leave the window open so that you can monitor the analog input, click **Save**. To save the changes and close the window, click **OK**.

3.6.4 Setting the type of analog input signal

The GC's analog inputs can receive two types of signal: volts and a 4-20 mA current, which is the industry standard. To set the type of signal generated by the analog input device, do the following:

1. Select **Analog Input...** from the **Hardware** menu. The *Analog Input* window displays.

Figure 3-27. The Analog Inputs window



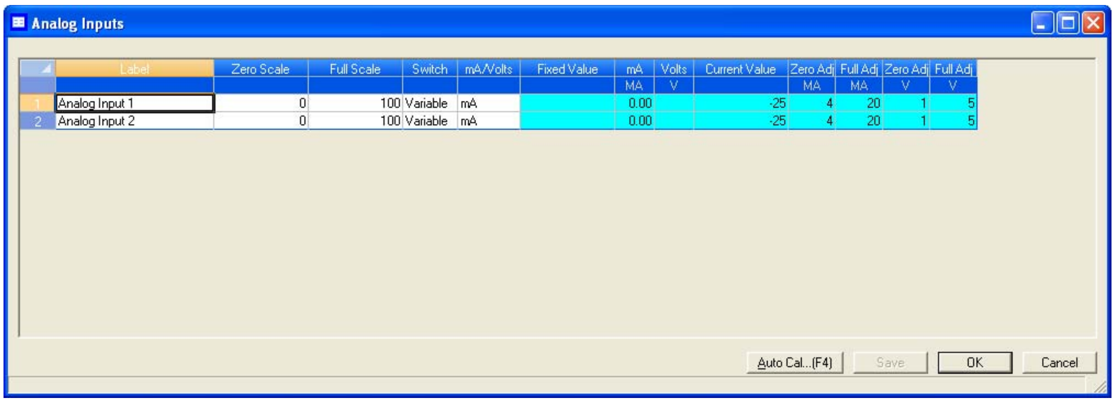
2. Select the signal type from the appropriate row under the *mA/Volt* column.

3. To save the changes and leave the window open so that you can monitor the analog input's progress, click **Save**. To save the changes and close the window, click **OK**. The type of signal being generated displays in the *mA/Volts* column, and is updated in real time.

3.6.5 Monitoring the status of an analog input

To check an analog input's status, select **Analog Input...** from the **Hardware** menu.

Figure 3-28. The Analog Inputs window



The operational status of each analog input displays under the *Status* column. There are three possible status readings, and their meanings are as follows:

OK	The analog input is installed and is working correctly.
Not Installed	The analog input is not installed.
Error	The analog input is installed but the GC cannot communicate with it.

This window also displays other types of data, such as the following:

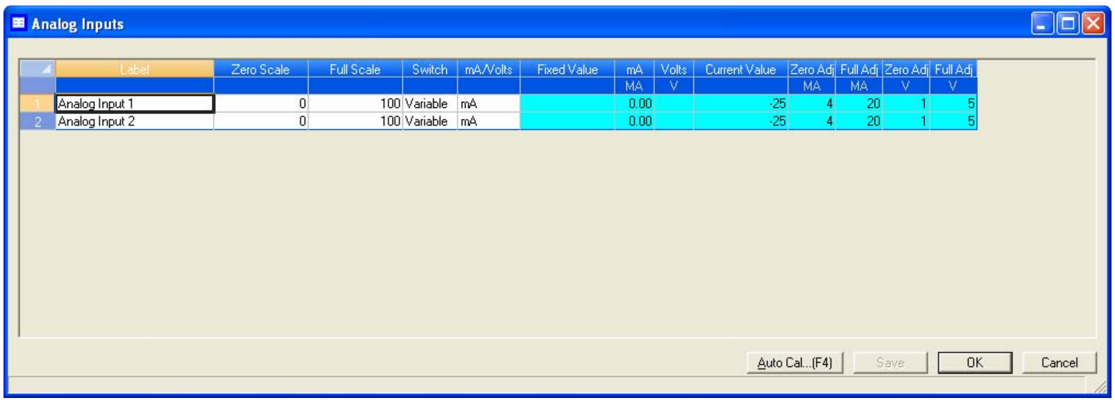
- **mA/Volts** - The type of analog input signal being received.
- **mA** - If **mA** displays in the *mA/Volts* column, then this column displays the amount of current being received, in milliamperes.
- **Volts** - If **Volts** displays in the *mA/Volts* column, then this column displays the amount of current being received, in volts.
- **Cur Val** - The current value of the analog input signal.

3.6.6 Calibrating an analog input

To calibrate an analog input, do the following:

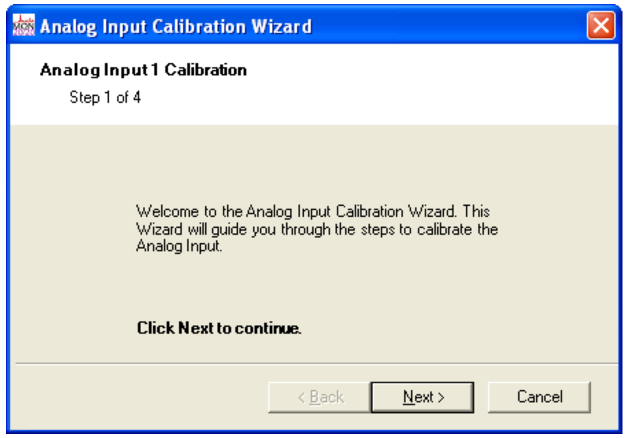
1. Select **Analog Input...** from the **Hardware** menu. The *Analog Input* window displays.

Figure 3-29. The Analog Inputs window



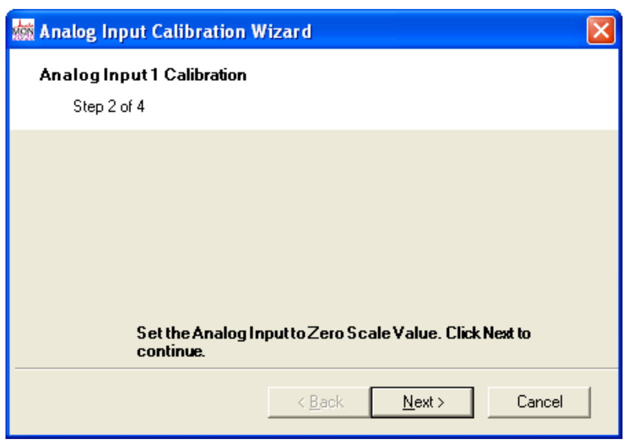
2. Click on the analog input that you want to calibrate.
3. Set the analog input's *Zero Scale* by entering its minimum anticipated value.
4. Set the analog input's *Full Scale* by entering your maximum anticipated value.
5. Click **AutoCal...(F4)** or press **F4**. The *Analog Input Calibration Wizard* runs.

Figure 3-30. The Analog Input Calibration Wizard



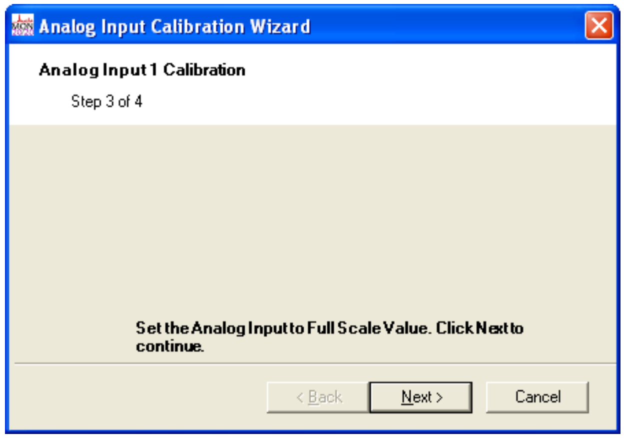
6. Click **Next**. Step 2 of the *Analog Input Calibration Wizard* displays.

Figure 3-31. Step 2 of the Analog Input Calibration WIZARD



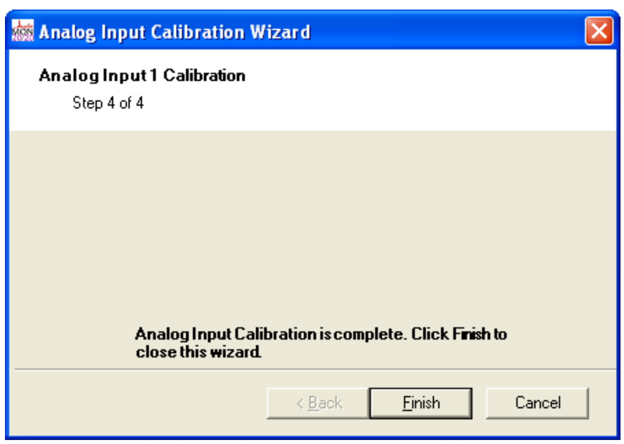
7. Click **Next**. Step 3 of the *Analog Input Calibration Wizard* displays.

Figure 3-32. Step 3 of the Analog Input Calibration Wizard



8. Click **Next**. Step 4 of the *Analog Input Calibration Wizard* displays.

Figure 3-33. Step 4 of the Analog Input Calibration Wizard



9. Click **Finish**. The calibration is complete.

3.7 Managing your gas chromatograph's analog outputs

With MON 20/20 you can control them in the following ways:

- Assign identifying labels.
- Assign scale ranges.
- Calibrate analog outputs for zero and full scale values.

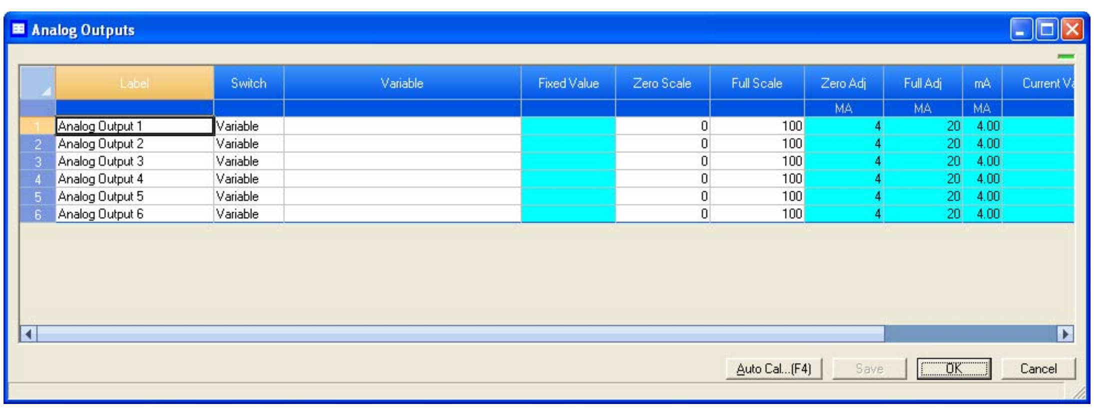
Note
This window contains a hidden column labelled *Physical Name*. For more information about this column and how to display it, see "Viewing the Physical Name column" on page 1-38.

3.7.1 Renaming an analog output

Give each analog output a descriptive label to avoid confusing one unit for another. To assign an identifying label, do the following:

10. Select **Analog Outputs...** from the **Hardware** menu. The *Analog Outputs* window displays.

Figure 3-34. The Analog Outputs window



11. Double-click on the appropriate row under the *Label* column for the analog output that you want to rename.

Note
The analog output devices are labelled **Analog Output 1** - **Analog Output** *N* by default, where *N* equals the total number of analog outputs available to the GC.

---

12. Type in a new descriptive name for the analog output.
13. Click **OK**.

3.7.2 Setting a analog output's operational mode

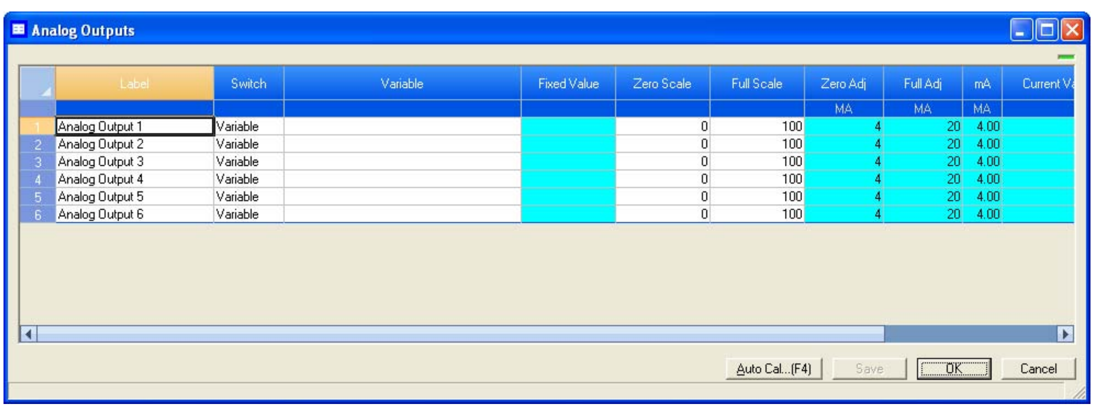
An analog output has two operational modes: **Variable** and **Fixed**.

- Setting the switch to **Variable** means that the analog output will be proportional to the variable selected in from the *Variables* column.
- Setting the switch to **Fixed** means that the analog output will be set to the value that is entered in the appropriate row under the *Fixed Value* column.

To set an analog output's operational mode, do the following:

1. Select **Analog Output...** from the **Hardware** menu. The *Analog Output* window displays.

Figure 3-35. The Analog Outputs window



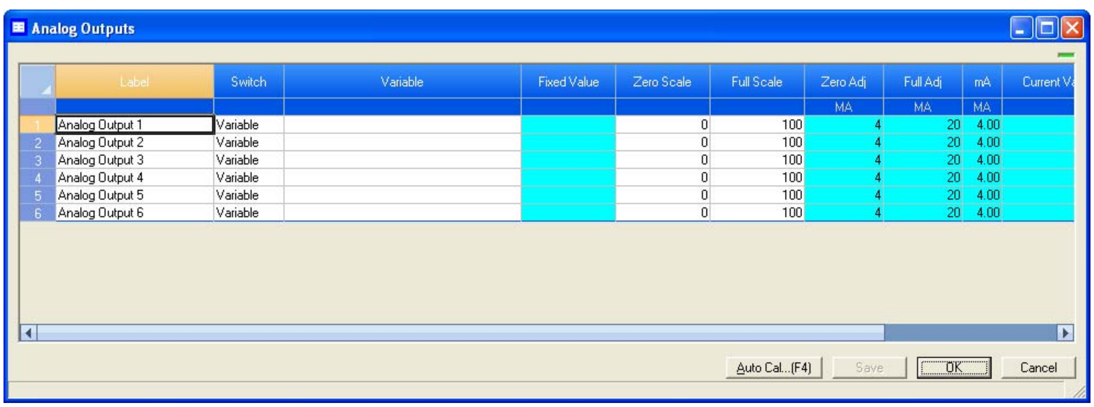
2. Select the desired mode from the drop-down menu under the *Switch* cloumn for the analog output.
3. To save the changes and leave the window open so that you can monitor the analog output, click **Save**. To save the changes and close the window, click **OK**. The current value of the analog output displays in the *Cur Val* column, and is updated in real time.

3.7.3 Setting the scale values for an analog output device

To set the zero scale and full scale, which are used when converting the analog output value, do the following:

1. Select **Analog Output...** from the **Hardware** menu. The **Analog Output** window displays.

Figure 3-36. The Analog Outputs window



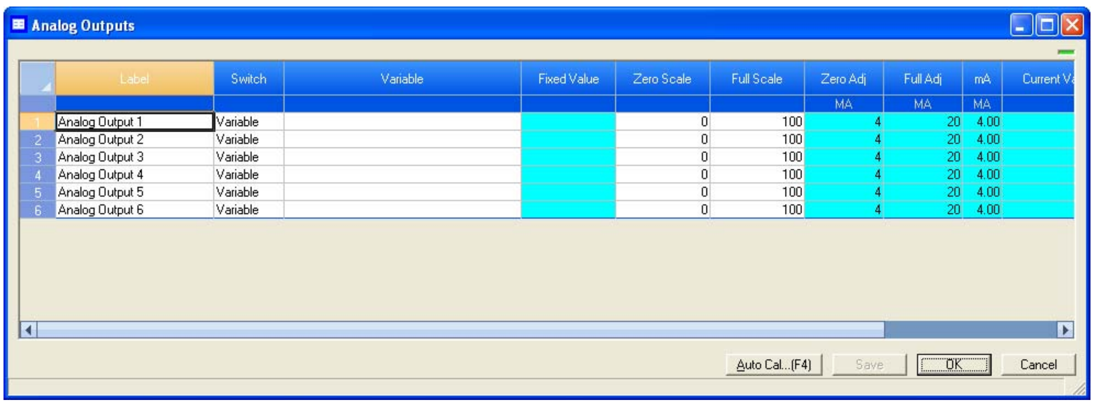
2. Click on appropriate row under the *Zero Scale* column and enter a zero scale value.
3. Click on appropriate row under the *Full Scale* column and enter a full scale value.
4. To save the changes and leave the window open so that you can monitor the analog input's progress, click **Save**. To save the changes and close the window, click **OK**.

3.7.4 Mapping a system variable to an analog output

To select the system variable on which to base the signal level of the analog output, do the following:

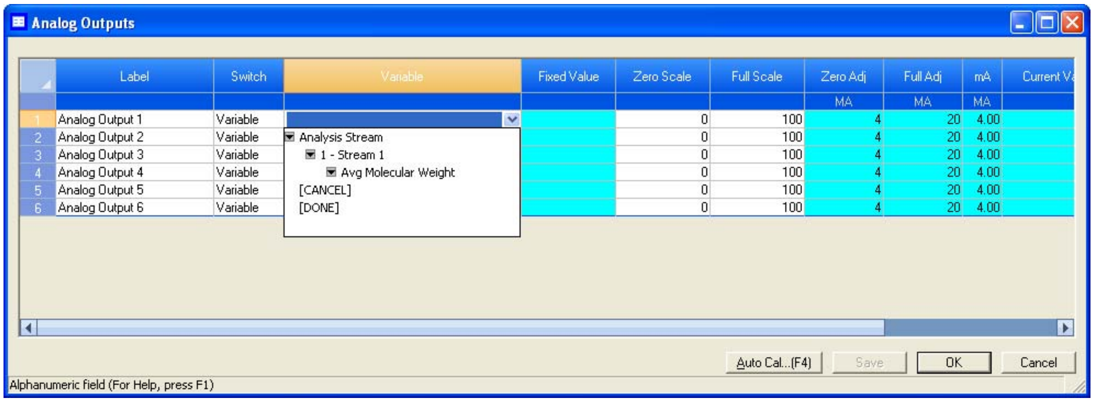
1. Select **Analog Output...** from the **Hardware** menu. The *Analog Output* window displays.

Figure 3-37. The Analog Outputs window



2. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

Figure 3-38. The Analog Outputs window with Variable drop-down menu

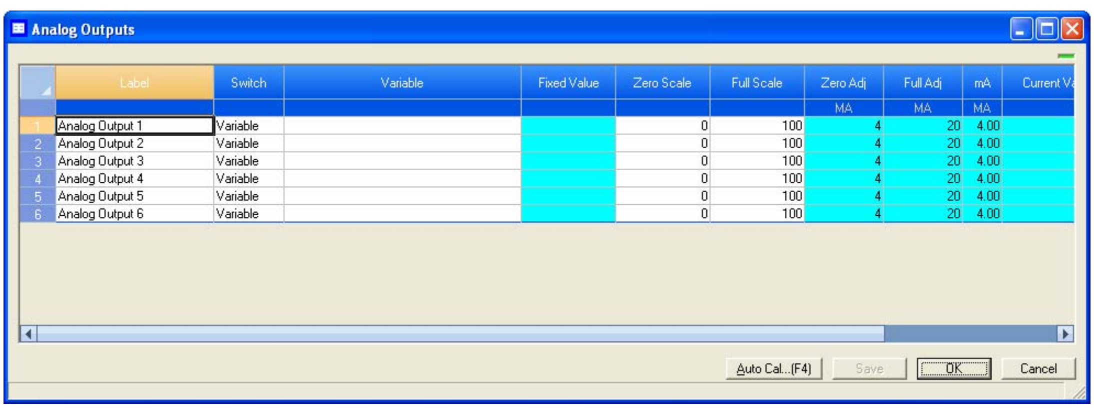


3. To save the changes and leave the window open so that you can monitor the analog output's progress, click **Save**. To save the changes and close the window, click **OK**.

3.7.5 Monitoring the status of an analog output

To check an analog output device's status, select **Analog Output...** from the **Hardware** menu.

Figure 3-39. The Analog Outputs window



The operational status of each analog output displays under the *Status* column. There are three possible status readings, and their meanings are as follows:

OK	The analog output device is installed and is working correctly.
Not Installed	The analog output device is not installed.
Error	The Heater/Solenoid board is installed but the GC cannot communicate with it.

This window also displays other types of data, such as the following:

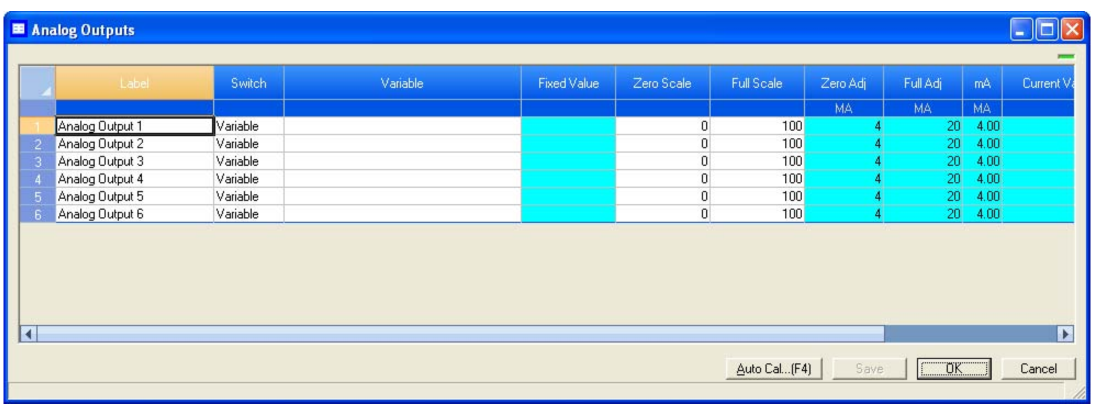
- **mA** - The amount of current being generated in milliamperes.
- **Cur Val** - The current scaled value of the analog output signal.

3.7.6 Calibrating an analog output

To automatically calibrate an analog output, do the following:

1. Select **Analog Output...** from the **Hardware** menu. The *Analog Outputs* window displays.

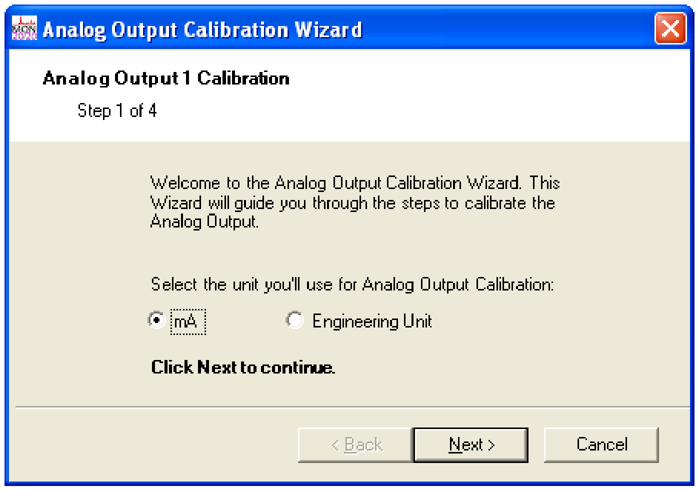
Figure 3-40. The Analog Outputs window



2. Click on the analog output that you want to calibrate.

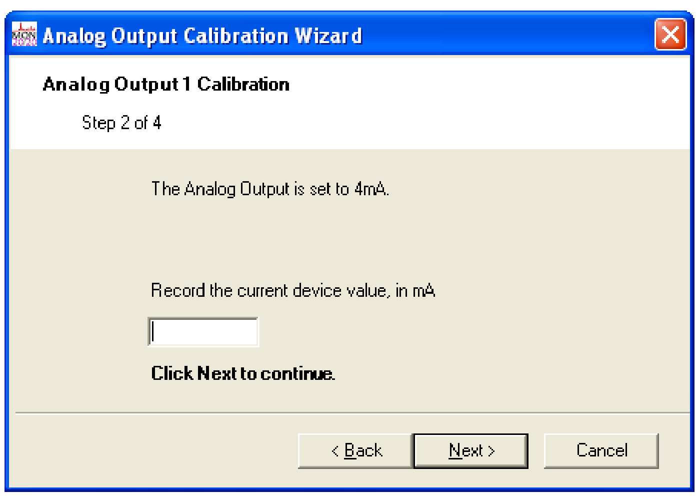
3. Click **AutoCal...(F4)** or press **F4**. The *Analog Output Calibration Wizard* runs.

Figure 3-41. The Analog Output Calibration Wizard



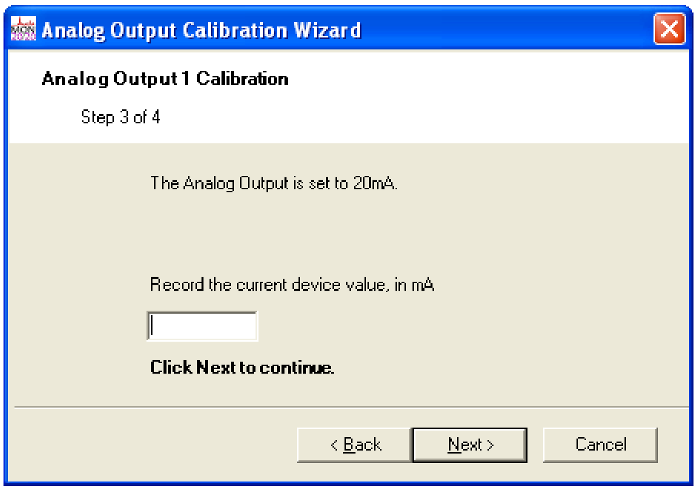
4. Select the check box for the unit of measure you want to use for the calibration and then click **Next**. Step 2 of the *Analog Output Calibration Wizard* displays.

Figure 3-42. Step 2 of the Analog Output Calibration Wizard



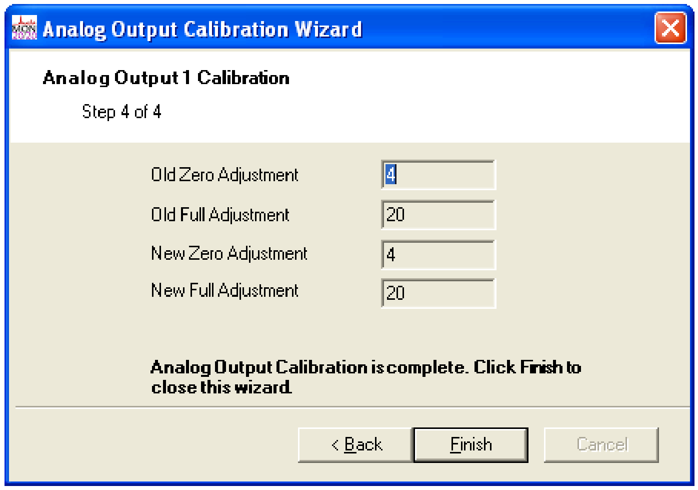
5. Enter the Zero Scale Adjustment value and then click **Next**. If the value entered is within tolerance, it is accepted and Step 3 of the *Analog Output Calibration Wizard* displays. If the value is not within tolerance, an error icon ( ) appears beside the field. Tolerance is set to ±1mA of the analog output's default zero adjustment setting, which is 4mA. Enter a different value and try again.

Figure 3-43. Step 3 of the Analog Output Calibration Wizard



6. Enter the Full Scale Adjustment value and then click **Next**. If the value entered is within tolerance, it is accepted and Step 4 of the *Analog Output Calibration Wizard* displays. If the value is not within tolerance, an error icon ( ) appears beside the field. Tolerance is set to ±1mA of the analog output's default full adjustment setting, which is 20mA. Enter a different value and try again.

Figure 3-44. Step 4 of the Analog Output Calibration Wizard

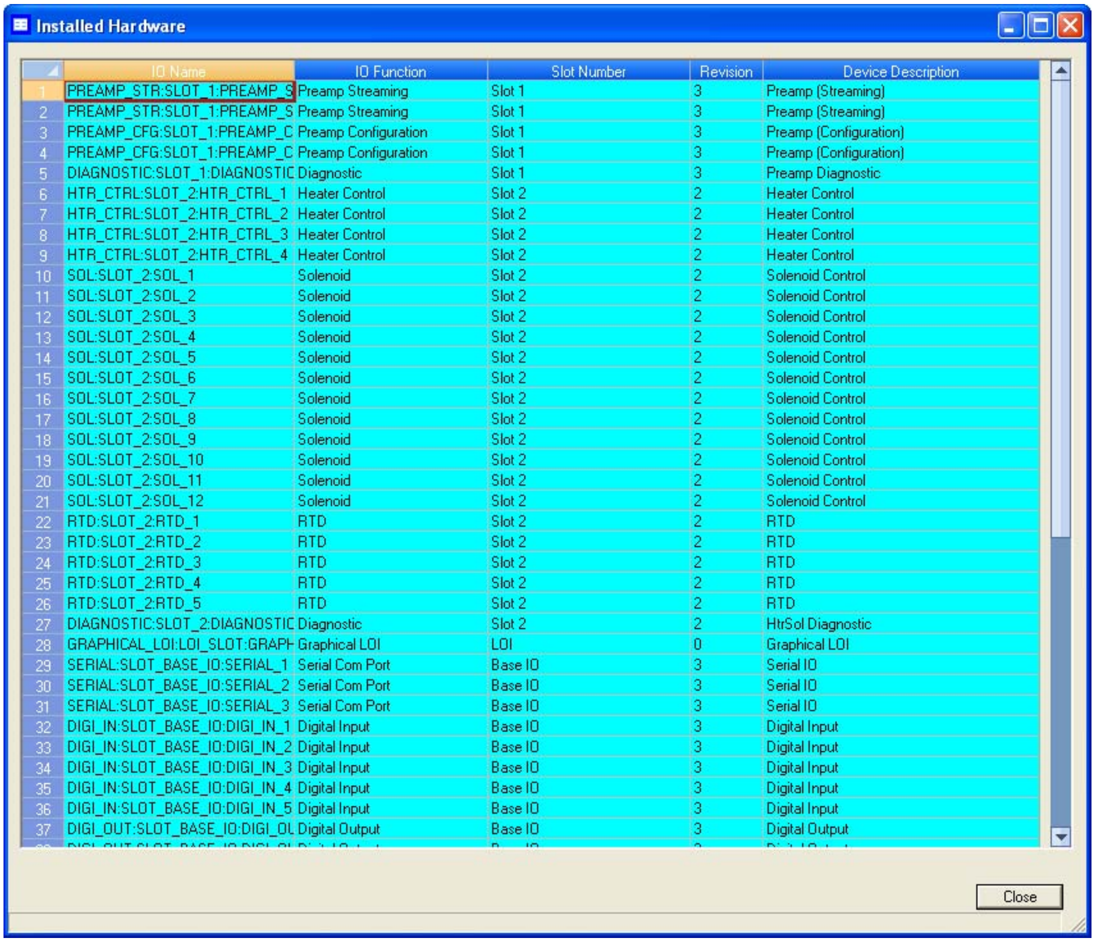


7. Click **Finish**. The calibration is complete.

3.8 Reviewing the Hardware Inventory List

MON 20/20 can compile an inventory table of all hardware that is installed on the GC. To view this table, select **Installed Hardware...** from the **Hardware** menu.

Figure 3-45. The Installed Hardware window



	IO Name	IO Function	Slot Number	Revision	Device Description
1	PREAMP_STR:SLOT_1:PREAMP_S	Preamp Streaming	Slot 1	3	Preamp (Streaming)
2	PREAMP_STR:SLOT_1:PREAMP_S	Preamp Streaming	Slot 1	3	Preamp (Streaming)
3	PREAMP_CFG:SLOT_1:PREAMP_C	Preamp Configuration	Slot 1	3	Preamp (Configuration)
4	PREAMP_CFG:SLOT_1:PREAMP_C	Preamp Configuration	Slot 1	3	Preamp (Configuration)
5	DIAGNOSTIC:SLOT_1:DIAGNOSTIC	Diagnostic	Slot 1	3	Preamp Diagnostic
6	HTR_CTRL:SLOT_2:HTR_CTRL_1	Heater Control	Slot 2	2	Heater Control
7	HTR_CTRL:SLOT_2:HTR_CTRL_2	Heater Control	Slot 2	2	Heater Control
8	HTR_CTRL:SLOT_2:HTR_CTRL_3	Heater Control	Slot 2	2	Heater Control
9	HTR_CTRL:SLOT_2:HTR_CTRL_4	Heater Control	Slot 2	2	Heater Control
10	SOL:SLOT_2:SOL_1	Solenoid	Slot 2	2	Solenoid Control
11	SOL:SLOT_2:SOL_2	Solenoid	Slot 2	2	Solenoid Control
12	SOL:SLOT_2:SOL_3	Solenoid	Slot 2	2	Solenoid Control
13	SOL:SLOT_2:SOL_4	Solenoid	Slot 2	2	Solenoid Control
14	SOL:SLOT_2:SOL_5	Solenoid	Slot 2	2	Solenoid Control
15	SOL:SLOT_2:SOL_6	Solenoid	Slot 2	2	Solenoid Control
16	SOL:SLOT_2:SOL_7	Solenoid	Slot 2	2	Solenoid Control
17	SOL:SLOT_2:SOL_8	Solenoid	Slot 2	2	Solenoid Control
18	SOL:SLOT_2:SOL_9	Solenoid	Slot 2	2	Solenoid Control
19	SOL:SLOT_2:SOL_10	Solenoid	Slot 2	2	Solenoid Control
20	SOL:SLOT_2:SOL_11	Solenoid	Slot 2	2	Solenoid Control
21	SOL:SLOT_2:SOL_12	Solenoid	Slot 2	2	Solenoid Control
22	RTD:SLOT_2:RTD_1	RTD	Slot 2	2	RTD
23	RTD:SLOT_2:RTD_2	RTD	Slot 2	2	RTD
24	RTD:SLOT_2:RTD_3	RTD	Slot 2	2	RTD
25	RTD:SLOT_2:RTD_4	RTD	Slot 2	2	RTD
26	RTD:SLOT_2:RTD_5	RTD	Slot 2	2	RTD
27	DIAGNOSTIC:SLOT_2:DIAGNOSTIC	Diagnostic	Slot 2	2	HtrSol Diagnostic
28	GRAPHICAL_LOI:LOI_SLOT:GRAPH	Graphical LOI	LOI	0	Graphical LOI
29	SERIAL:SLOT_BASE_IO:SERIAL_1	Serial Com Port	Base IO	3	Serial IO
30	SERIAL:SLOT_BASE_IO:SERIAL_2	Serial Com Port	Base IO	3	Serial IO
31	SERIAL:SLOT_BASE_IO:SERIAL_3	Serial Com Port	Base IO	3	Serial IO
32	DIGI_IN:SLOT_BASE_IO:DIGI_IN_1	Digital Input	Base IO	3	Digital Input
33	DIGI_IN:SLOT_BASE_IO:DIGI_IN_2	Digital Input	Base IO	3	Digital Input
34	DIGI_IN:SLOT_BASE_IO:DIGI_IN_3	Digital Input	Base IO	3	Digital Input
35	DIGI_IN:SLOT_BASE_IO:DIGI_IN_4	Digital Input	Base IO	3	Digital Input
36	DIGI_IN:SLOT_BASE_IO:DIGI_IN_5	Digital Input	Base IO	3	Digital Input
37	DIGI_OUT:SLOT_BASE_IO:DIGI_OU	Digital Output	Base IO	3	Digital Output

The type of hardware installed is listed under the *Device Description* column. The other types of information available on this screen are the following:

- **IO Function** - Describes the function of the device.
- **Slot Number** - Describes the location of the device on the GC. The slot number refers to the card cage assembly, which is located in the GC's lower enclosure and which has eight slots:
  - Slot 1
  - Slot 2
  - Slot 3
  - Slot 4
  - Base IO
  - ROC Expansion 1
  - ROC Expansion 2
  - CPU.
- **Revision** - The revision number of the backplane.

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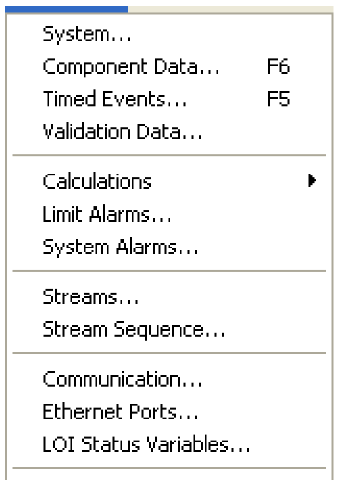
Section 4: Using the Application functions



Many of the variables that a gas chromatograph uses during an analysis run—such as timed events, stream sequence, and calculation types—can be easily managed through MON 20/20.

This chapter explains how to do the following:

- View and edit general information about the GC to which MON 20/20 is connected, such as name, model, and default stream sequence.
- View and edit component data, validation data, and timed event tables.
- View and change control, average, and user-defined calculations.
- View and edit limit alarm data.
- View and change stream data.
- View and edit the stream sequence.
- View and edit communication and ethernet port data.
- View and map LOI status variables.
- View and map the Foundation Fieldbus Process Variables.

4.1 Managing the system

Use this function to select the default GC stream sequence and to set or edit system-wide variables such as the GC's name, serial number, and system description. See Table 5-1 for a list of the items that are available on the *System* window, along with their related functions.

To view the *System* window, select **System...** from the **Application** menu.

Figure 4-1. The System window

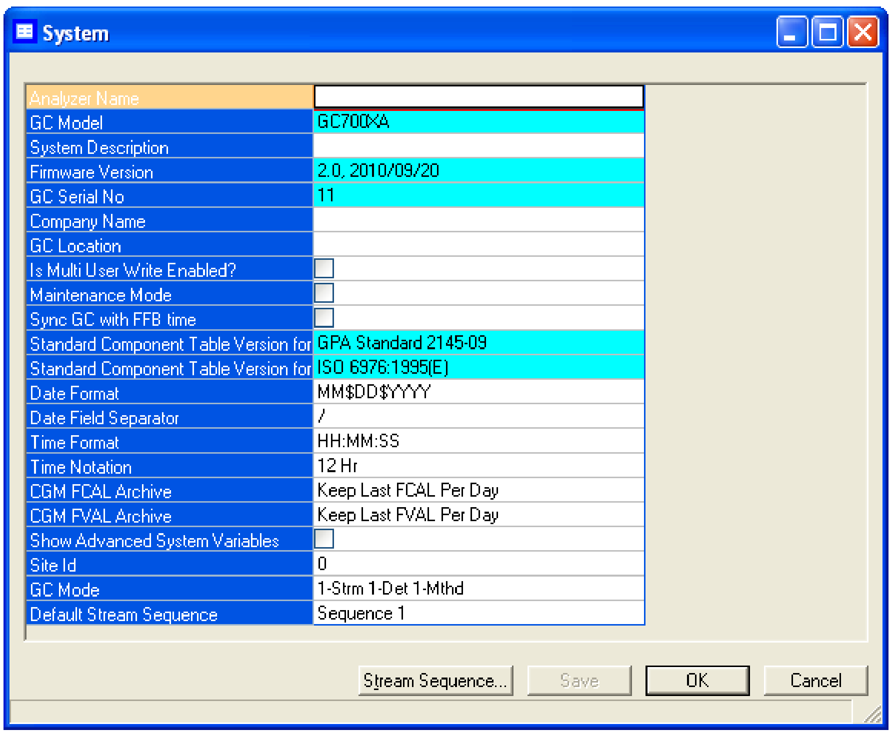


Table 4-1. List of fields from System window

Field Name	**Description**
Analyzer Name	Defines the GC name that appears in the Status Bar on the main window when MON 20/20 is connected to the GC. Can contain up to 12 characters.
GC Model	The model number of the GC to which MON 20/20 is connected.
System Description	A field to record miscellaneous reference information to further identify the currently connected system. Can contain up to 28 characters.
Firmware Version	Revision level of firmware of the GC to which MON 20/20 is connected.
GC Serial No	Serial number of the GC to which MON 20/20 is connected.
Company Name	The name of the company that operates the GC.
GC Location	The physical location of the GC to which MON 20/20 is connected.
Is Multi User Write Enabled?	Determines whether all supervisor-level users that connect to the GC have write access, or just the first supervisor-level user to connect. Options are **True** and **False**.
Maintenance Mode	Switches the GC to maintenance mode and triggers an alarm that the GC is down for maintenance.
Sync GC with FFB time	Sets the GC's time to match the Foundation Fieldbus' time.
Standard Component Table Version for GPA	Indicates which version of the GPA's standard component table is being used.
Standard Component Table Version for ISO	Indicates which version of the ISO's standard component table is being used.
Date Format	Defines how the date will be displayed. The options are: • MM$$DD$$YYYY • MMDDYY • DDMMYYYY • DDMMYY • YYYYMMDD • YYMMDD $ is the Date Field Separator.
Date Field Separator	Defines the text symbol that will be used as the separator when displaying the date. The options are: • / • - • .

Table 4-1. List of fields from System window

Field Name	Description
Time Format	Defines how the time will be displayed. The options are: • HH:MM:SS • HH:MM
Time Notation	Defines the cycle of time to use when displaying the time. The options are: • 12 Hr • 24 Hr
CGM FCAL Archive	Sets the storage behavior for final calibration chromatograms. The options are: • Keep Last FCAL Per Day - Saves only the last final calibration chromatogram of the day. • Keep All FCAL Per Day - Saves all final calibration chromatograms.
CGM FVAL Archive	Sets the storage behavior for final validation chromatograms. The options are: • Keep Last FVAL Per Day - Saves only the last final validation chromatogram of the day. • Keep All FVAL Per Day - Saves all final validation chromatograms.
Show Advanced System Variables	Determines whether advanced system variables will be displayed along with basic system variables. See “Basic and advanced system variables” on page D-1 for more information.
Site Id	Holds customer-defined site identification information.
GC Mode	Allows you to select an operating mode for the GC. See “Operating modes for MON 20/20” on page 1-38 for more information.
Default Stream Sequence	Sets the default sequence to be used by the indicated detector during auto-sequencing. To create a new stream sequence or to edit an already-created sequence, click **Stream Sequence...**. See “Creating a stream sequence for a detector” on page 4-78 for more information.

After making changes, click **Save** to save the changes without closing the window. To save the changes and close the window, click **OK**.

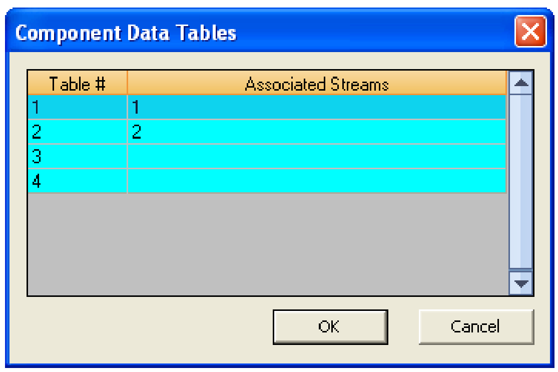
4.2 Managing Component Data Tables

MON 20/20 allows you to view and edit the component data tables. The number of available component data tables depends on the GC unit configuration.

To assign a component data table to a stream, see "Assigning a valve to a stream and setting the relationship between the stream's open state to the valve's On/Off state" on page 4-76.

1. To view a component data table, select **Component Data...** from the **Application** menu. The *Component Data Tables* window appears, displaying a list of available component data tables.

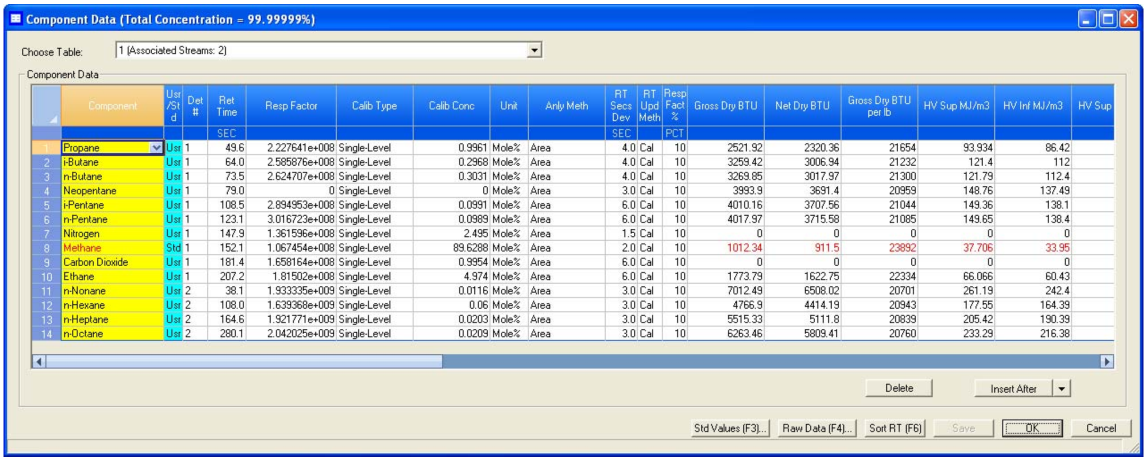
Figure 4-2. The Component Data Tables window



Note
Other ways of accessing the component data tables are by pressing F6 or by clicking  from the Toolbar.

2. Select the table that you want to view. The selected component data table displays.

Figure 4-3. The selected component data table



	Component	Usr/Std	Det #	Ret Time	Resp Factor	Calib Type	Calib Conc	Unit	Anly Meth	RT Secs Dev	RT Upd Meth	Resp Fact %	Gross Dry BTU	Net Dry BTU	Gross Dry BTU per lb	HV Sup MJ/m3	HV Inf MJ/m3	HV Sup
				SEC						SEC		PCT						
1	Propane	Usr	1	49.6	2.227641e+008	Single-Level	0.9961	Mole%	Area	4.0	Cal	10	2521.92	2320.36	21654	93.934	86.42	
2	i-Butane	Usr	1	64.0	2.585876e+008	Single-Level	0.2968	Mole%	Area	4.0	Cal	10	3259.42	3006.94	21232	121.4	112	
3	n-Butane	Usr	1	73.5	2.624707e+008	Single-Level	0.3031	Mole%	Area	4.0	Cal	10	3269.85	3017.97	21300	121.79	112.4	
4	Neopentane	Usr	1	79.0	0	Single-Level	0	Mole%	Area	3.0	Cal	10	3993.9	3691.4	20959	148.76	137.49	
5	i-Pentane	Usr	1	108.5	2.894953e+008	Single-Level	0.0991	Mole%	Area	6.0	Cal	10	4010.16	3707.56	21044	149.36	138.1	
6	n-Pentane	Usr	1	123.1	3.016723e+008	Single-Level	0.0989	Mole%	Area	6.0	Cal	10	4017.97	3715.58	21085	149.65	138.4	
7	Nitrogen	Usr	1	147.9	1.361596e+008	Single-Level	2.495	Mole%	Area	1.5	Cal	10	0	0	0	0	0	
8	Methane	Std	1	152.1	1.067454e+008	Single-Level	89.6288	Mole%	Area	2.0	Cal	10	1012.34	911.5	23892	37.706	33.95	
9	Carbon Dioxide	Usr	1	181.4	1.658164e+008	Single-Level	0.9954	Mole%	Area	6.0	Cal	10	0	0	0	0	0	
10	Ethane	Usr	1	207.2	1.81502e+008	Single-Level	4.974	Mole%	Area	6.0	Cal	10	1773.79	1622.75	22334	66.066	60.43	
11	n-Nonane	Usr	2	38.1	1.933335e+009	Single-Level	0.0116	Mole%	Area	3.0	Cal	10	7012.49	6508.02	20701	261.19	242.4	
12	n-Hexane	Usr	2	108.0	1.639368e+009	Single-Level	0.06	Mole%	Area	3.0	Cal	10	4766.9	4414.19	20943	177.55	164.39	
13	n-Heptane	Usr	2	164.6	1.921771e+009	Single-Level	0.0203	Mole%	Area	3.0	Cal	10	5515.33	5111.8	20839	205.42	190.39	
14	n-Octane	Usr	2	280.1	2.042025e+009	Single-Level	0.0209	Mole%	Area	3.0	Cal	10	6263.46	5809.41	20760	233.29	216.38	

Note
To see a different table, select it from the *Choose table* drown-down list.

Note
To sort the list of components by detector, and then by retention time, click Sort RT.

4.2.1 Editing a Component Data Table

Note
Table cells with a white background are editable; table cells with a turqoise background are not editable.

To edit a cell, do the following:

1. Click on the cell. Depending on the cell type, you will either be required to select a value from a drop-down list, or you will be able to type in the value directly.
2. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

The following table lists all of the editable parameters that are available on the component data table. The standard values for these parameters were taken from the second editions of the *Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids* and the *Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases*.

Parameter	Description
Component	This drop-down list contains the complete catalog of available components for the selected stream.
Usr Std	Indicates the source of the component: • **Usr** - The component was edited or defined by the user. • **Std** - The component was selected from the standard list of components and no changes were made to its standard data.
Det #	The component's detector number.
Ret Time	Time in seconds before the apex of the component's peak will appear. The rentention time can be set from **0** to **3600** seconds. **CAUTION**: Ensure that the component retention times do not exceed the analysis time, as defined by the Timed Events table. MON 20/20 does not automatically prevent the user from defining excessive component retention times.
Resp Fact	A component's response factor is equal to the raw data of the component's peak divided by the component's concentration. The maximum value is 1.0E+38.
Calib Type	MON 20/20 can perform four types of calibrations: • **Single-Level** - Uses the standard calibration in which the response factor is needed to determine the mole percentage during the calibration. • **Fixed** - During the calibration, the response factor is not updated. • **Relative** - Calibration in which a reference component is used to compute the mole percentage. • **Multi-Level** - Uses a polynomial equation to compute the mole percentage during the calibration. Values must be entered in the Mult-level Calib 'a', Mult-level Calib 'b', Mult-level Calib 'c', and Mult-level Calib 'd' cells. See "Multi-level calibration" on page B-13 for more information.
Calib Conc	The amount, in mole percent, parts per million (ppm) or parts per billion (ppb), of the component that is present in the calibration gas.
Unit	Indicates the unit of measure used when calculating and displaying the component's calibration concentration. Options are **Mole%**, **ppm** and **ppb**.

Parameter	Description
Anly Meth	Used to determine the component's raw data value. Options are: • **Area** - Raw data value is proportional to the area under the peak. • **Height** - Raw data value is proportional to the height of the peak. • **Fixed** - Raw data value is proportional to a value that is set by the user. • **Analog Input** - Data signal comes from an external analyzer.
RT Secs Dev	The maximum acceptable deviation time, in seconds, of the new retention time from the current retention time.
RT Upd Meth	Determines when the retention time will be updated. Options are: • **Cal** - Updates the retention time only during the final calibration run. • **Anly** - Updates after each analysis.
Resp Fact %	The maximum acceptable percent of deviation between the new response factor and the current response factor.
Gross Dry BTU	Gross energy content per cubic foot (ft^3), assuming no water is present.
Net Dry BTU	Net energy content per cubic foot, assuming no water is present.
Gross Dry BTU per lb	Gross energy content per pound, assuming no water is present.
HV Sup MJ/m^3	Gross heating value in megajoules per cubic meter (MJ/m^3).
HV Inf MJ/m^3	Net heating value in megajoules per cubic meter (MJ/m^3).
HV Sup MJ/kg	Gross heating value in megajoules per kilogram (MJ/kg).
HV Inf MJ/kg	Net heating value in megajoules per kilogram (MJ/kg).
Sum Factor Pri	Used to calculate the compressibility factor.
Sum Factor Sec	Used to calculate the compressibility factor.
CV Superior Pri	Gross caloric value per kilojoule (kJ).
CV Inferior Pri	Net caloric value per kilojoule (kJ).
CV Superior Sec	Gross caloric value per kilojoule (kJ).
CV Inferior Sec	Net caloric value per kilojoule (kJ).
Gals/1000 SCF	Liquid equivalent volume in gallons/1000ft^3.
Reid Vapor	The component's vapor pressure in pounds per square inch (psia) at 100.0°F
LBs/Gallon	Liquid density for the component at base conditions.
Rel Dens Gas	The relative density of the gas phase for the component at base conditions.
Rel Dens Liquid	The relative density of the liquid phase for the component at base conditions.
Molecular Weight	The molecular weight of the component, which is used to calculate the weight percent of each component in the sample.
Carbon Weight	The molecular weight of the carbon atoms in the component.

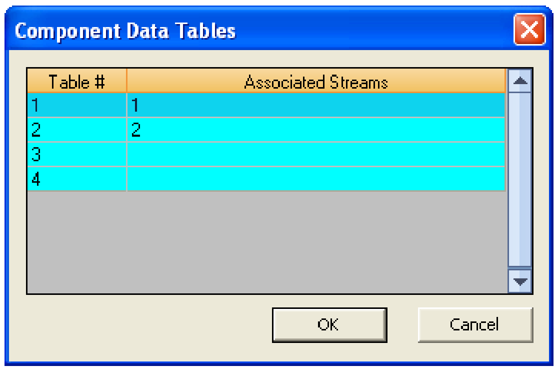
Parameter	Description
AGA 8 Component	The name of the component according to the American Gas Association, which is used in the AGA 8 compressibility calculation.
Ref Comp	The component not found in the calibration gas but in the sample gas for indirect calibration. If 'none', normal (direct) calibration is used. Not editable unless the calibration type is set to **Relative**.
Rel Resp Fact	A fixed multiple of the response factor of the component found in the sample gas for indirect calibration. Not editable unless the calibration type is set to **Relative**.
Rel Dens Liquid 15C	The relative density in kilograms per cubic meter (kg/m^3) of the liquid phase for the component at 15°C.
Molar Mass	The mass of one mole of the component.
Mult-level Calib 'a'	Third-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to **Multi-Level**.
Mult-level Calib 'b'	Second-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to **Multi-Level**.
Mult-level Calib 'c'	First-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to **Multi-Level**.
Mult-level Calib 'd'	Zero-order polynomial coefficient for multi-level calibrations. Not editable unless the calibration type is set to **Multi-Level**.
Component Code	An index number that corresponds to the standard component numbers taken from the American Gas Association. Up to 20 components can be defined per data table.

4.2.2 Adding a component to a Component Data Table

To add a component to a component data table, do the following:

1. Select **Component Data...** from the **Application** menu. The *Component Data Tables* window appears, displaying a list of available component data tables.

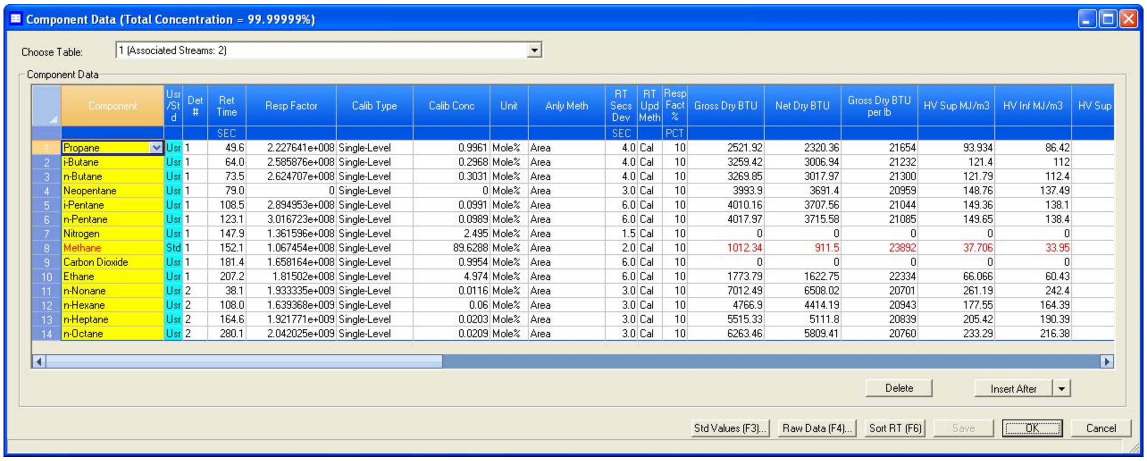
Figure 4-4. The Component Data Tables window



Note
Other ways of accessing the component data tables are by pressing **F6** or by clicking  from the Toolbar.

2. Select the table that you want to view. The selected component data table displays.

Figure 4-5. The selected component data table



	Component	Usr/Std	Det #	Ret Time	Resp Factor	Calib Type	Calib Conc	Unit	Anly Meth	RT Secs Dev	RT Upd Meth	Resp Fact %	Gross Dry BTU	Net Dry BTU	Gross Dry BTU per lb	HV Sup MJ/m3	HV Inf MJ/m3	HV Sup
				SEC						SEC		PCT						
1	Propane	Usr	1	49.6	2.227641e+008	Single-Level	0.9961	Mole%	Area	4.0	Cal	10	2521.92	2320.36	21654	93.934	86.42	
2	i-Butane	Usr	1	64.0	2.585876e+008	Single-Level	0.2968	Mole%	Area	4.0	Cal	10	3259.42	3006.94	21232	121.4	112	
3	n-Butane	Usr	1	73.5	2.624707e+008	Single-Level	0.3031	Mole%	Area	4.0	Cal	10	3269.85	3017.97	21300	121.79	112.4	
4	Neopentane	Usr	1	79.0	0	Single-Level	0	Mole%	Area	3.0	Cal	10	3993.9	3691.4	20959	148.76	137.49	
5	i-Pentane	Usr	1	108.5	2.894953e+008	Single-Level	0.0991	Mole%	Area	6.0	Cal	10	4010.16	3707.56	21044	149.36	138.1	
6	n-Pentane	Usr	1	123.1	3.016723e+008	Single-Level	0.0989	Mole%	Area	6.0	Cal	10	4017.97	3715.58	21085	149.65	138.4	
7	Nitrogen	Usr	1	147.9	1.361596e+008	Single-Level	2.495	Mole%	Area	1.5	Cal	10	0	0	0	0	0	
8	Methane	Std	1	152.1	1.067454e+008	Single-Level	89.6288	Mole%	Area	2.0	Cal	10	1012.34	911.5	23892	37.706	33.95	
9	Carbon Dioxide	Usr	1	181.4	1.658164e+008	Single-Level	0.9954	Mole%	Area	6.0	Cal	10	0	0	0	0	0	
10	Ethane	Usr	1	207.2	1.81502e+008	Single-Level	4.974	Mole%	Area	6.0	Cal	10	1773.79	1622.75	22334	66.066	60.43	
11	n-Nonane	Usr	2	38.1	1.933335e+009	Single-Level	0.0116	Mole%	Area	3.0	Cal	10	7012.49	6508.02	20701	261.19	242.4	
12	n-Hexane	Usr	2	108.0	1.639368e+009	Single-Level	0.06	Mole%	Area	3.0	Cal	10	4766.9	4414.19	20943	177.55	164.39	
13	n-Heptane	Usr	2	164.6	1.921771e+009	Single-Level	0.0203	Mole%	Area	3.0	Cal	10	5515.33	5111.8	20839	205.42	190.39	
14	n-Octane	Usr	2	280.1	2.042025e+009	Single-Level	0.0209	Mole%	Area	3.0	Cal	10	6263.46	5809.41	20760	233.29	216.38	

Note
To sort the list of components by detector, and then by retention time, click **Sort RT**.

3. If you want to add the component *above* the currently selected component, click **Insert before**. If you want to add the component *below* the currently selected component, select **Insert after** from the Insert arrow.

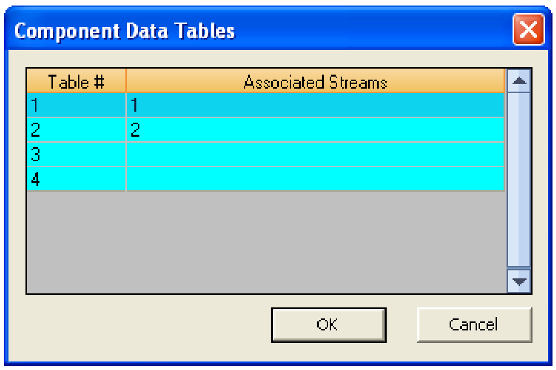
4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.2.3 Removing a component from a Component Data Table

To remove a component from a component data table, do the following:

1. Select **Component Data...** from the **Application** menu. The *Component Data Tables* window appears, displaying a list of available component data tables.

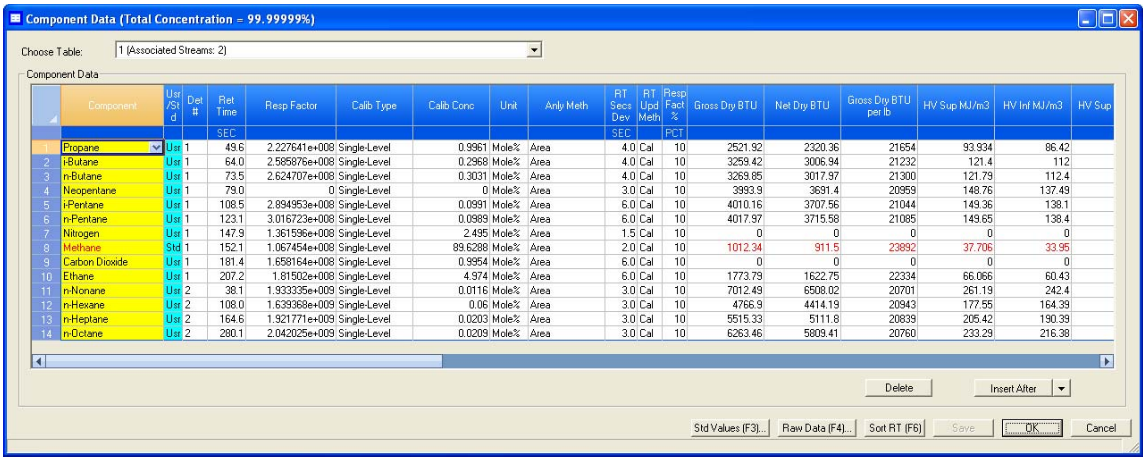
Figure 4-6. The Component Data Tables window



Note
Other ways of accessing the component data tables are by pressing **F6** or by clicking  from the Toolbar.

2. Select the table that you want to view. The selected component data table displays.

Figure 4-7. The selected component data table



Note
To sort the list of components by detector, and then by retention time, click **Sort RT**.

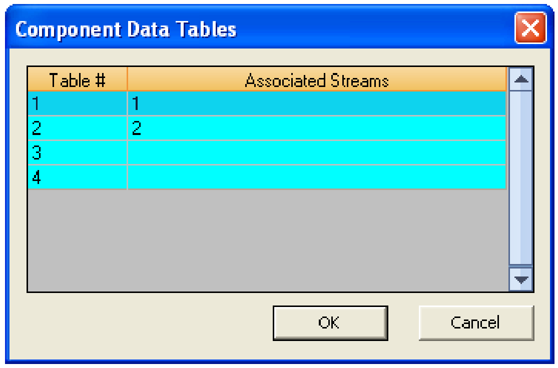
3. Select the component that you want to remove.
4. Click **Delete**.
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.2.4 Viewing the standard values for a component

If a component's values have been changed by the user, it is still possible to view the standard values for that particular component. To view the standard values for a component, do the following:

1. Select **Component Data...** from the **Application** menu. The *Component Data Tables* window appears, displaying a list of available component data tables.

Figure 4-8. The Component Data Tables window

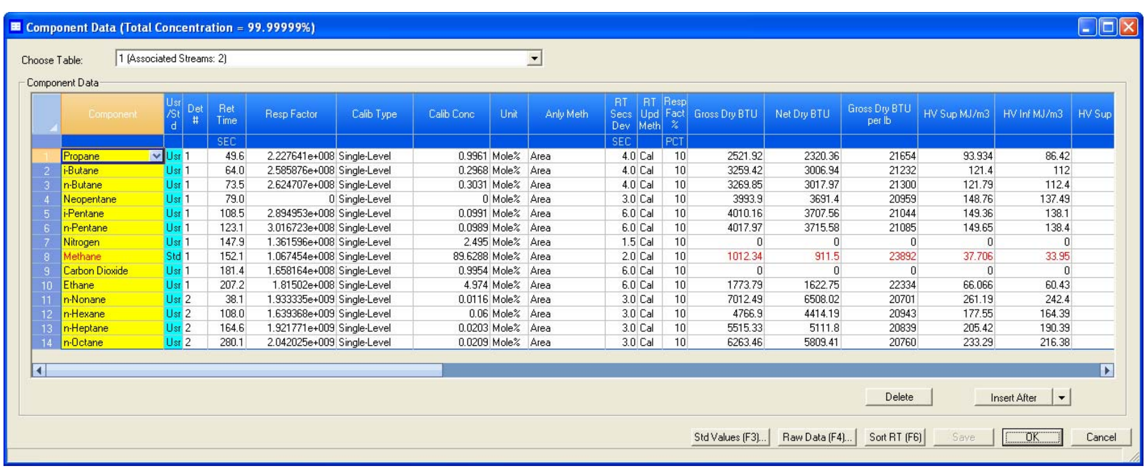


Note

Other ways of accessing the component data tables are by pressing **F6** or by clicking  from the Toolbar.

2. Select the table that you want to view. The selected component data table displays.

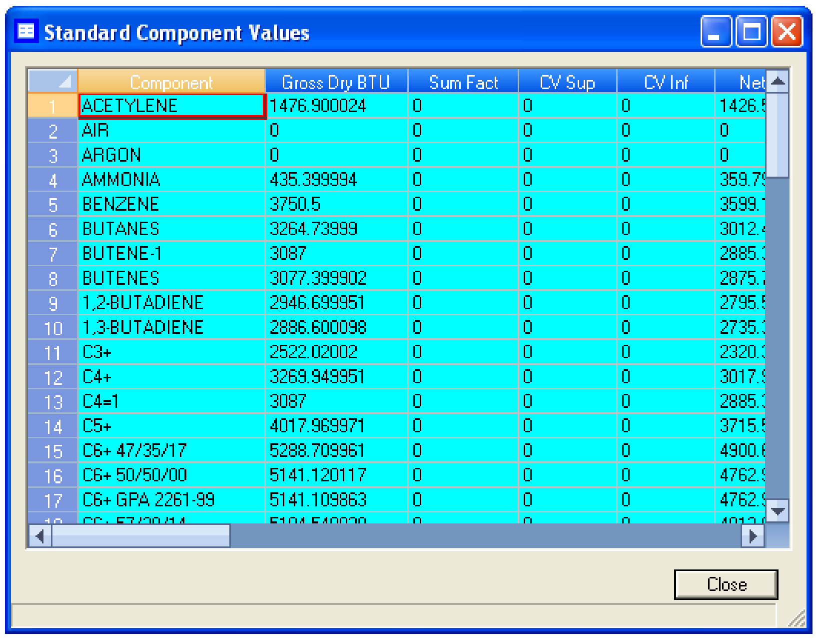
Figure 4-9. The selected component data table



Note
To sort the list of components by detector, and then by retention time, click **Sort RT**.

3. Click **Std Values (F3)**. The *Standard Component Values* window displays.

Figure 4-10. The Standard Component Values window



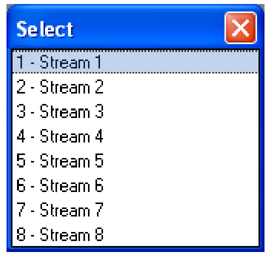
4. Click **Close**.

4.2.5 Viewing raw data

To view the raw data for the displayed component data table, do the following:

1. Click **Raw Data (F4)**. The *Select* dialog displays, listing the streams that are associated with the component data table.

Figure 4-11. The Select dialog



2. Double-click the desired stream.

   The *Raw Data* window appears, listing the peak raw data from the last run of the stream represented by the component data table.

Figure 4-12. The Raw Data window

	Peak No.	Ret Time	Peak Area	Peak Height	Det	Method	Integration Start	Integration End	Peak Width@ Half Height	Partial Peak
		SEC					SEC	SEC		
1	1	49.6	55808852	562518.4	1	4	46.9	57.1	1.9	No
2	2	64.0	19757518	136768.0	1	2	59.9	69.5	2.7	No
3	3	73.6	20477707	123722.6	1	3	69.5	81.8	3.1	No
4	4	108.5	7719908	28680.9	1	2	100.8	116.4	5.1	No
5	5	123.2	7988157	26985.3	1	3	116.4	135.1	5.6	No
6	6	148.0	86818862	1174634.0	1	4	145.5	152.3	1.4	No
7	7	154.4	2344153735	23950850.6	1	1	152.3	168.5	1.9	No
8	8	181.8	38035541	250715.7	1	4	176.8	191.8	2.9	No
9	9	208.9	218612850	1064496.7	1	1	201.6	224.4	4.0	No
10	1	108.0	0	0.0	2	500	76.0	108.0	0.0	No
11	2	164.6	0	0.0	2	500	108.5	164.6	0.0	No
12	3	280.1	0	0.0	2	500	166.3	280.1	0.0	No

The following data displays for each peak:

Name	Description
Peak No	Numerical identifier for the peak, listed by the order of discovery.
Ret Time	Time, in seconds, that the component eluted.
Peak Area	The area under the peak.
Peak Height	The maximum height of the peak.
Det #	The detector associated with the peak.
Method	Method of peak end detection. Options are: • 1 (Baseline) • 2 (Fused Peak) • 3 (Last Fused Peak) • 4 (Tangent Skim) • 100 (Inhibit) • 300 (Forced Integration) • 500 (Summation)
Integration Start	Time, in seconds, when integration started.
Integration Stop	Time, in seconds, when integration stopped.
Peak Width Half Height	The width of the peak taken at half of the peak's height.
Is Partial Peak	If Y, then the Partial Peak value is used in the summation calculation; if N, then the Partial Peak value is not used in the summation calculation.

3. Click **Close** to return to the component data table.

4.3 Managing timed events

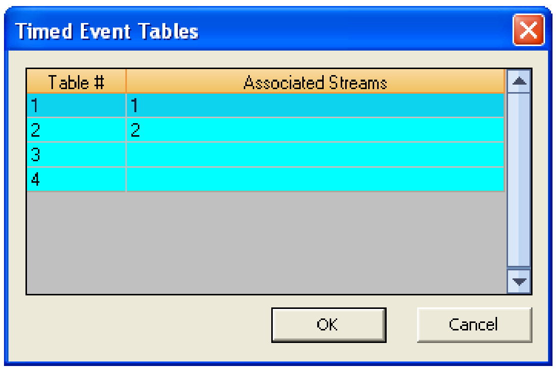
Use this function to view and/or edit the timed events tables assigned to and used by particular gas streams. The number of available timed events depends on the GC unit configuration. The standard GC application contains four timed events tables.

Note
See "Editing Timed Events from the Time Events window" on page 2-33 for more information.

To assign a timed events table to a stream, see "Assigning a valve to a stream and setting the relationship between the stream's open state to the valve's On/Off state" on page 4-76.

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-13. The Timed Events Tables selector window



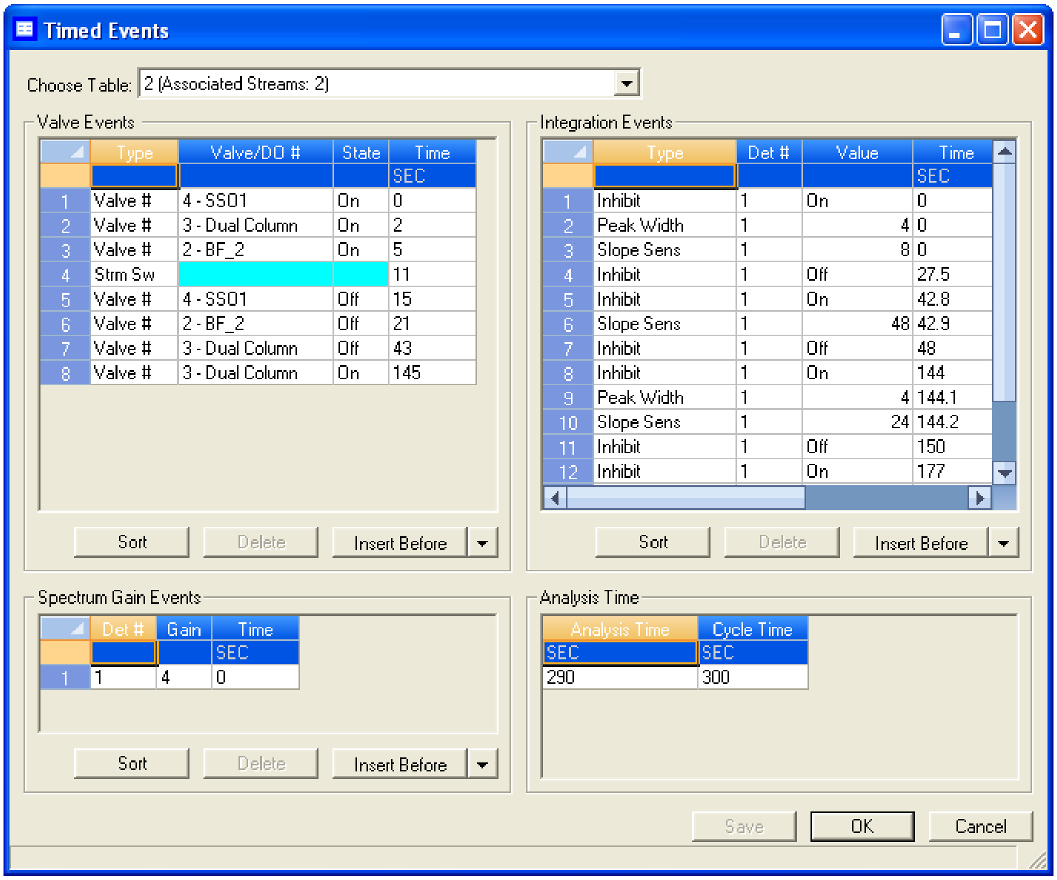
Note

Other ways of accessing the timed event tables are by pressing **F5** or by clicking  from the Toolbar.

Note
If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-14. The Timed Events window



Note
To sort events by time, click the appropriate **Sort** button.

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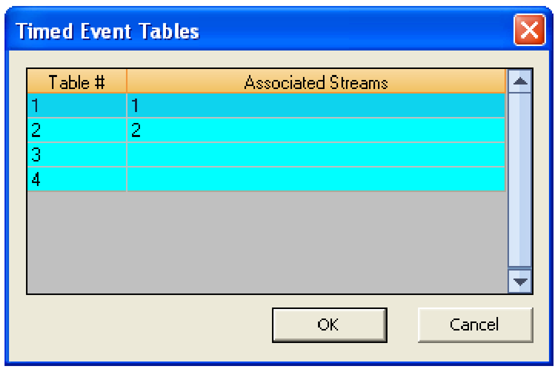
3. To see a different timed events table, select it from the *Choose table* drop-down list.

4.3.1 Editing valve events

Valve-related events are grouped on the upper left side of the *Timed Events* window. To edit valve-related events, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-15. The Timed Events Tables selector window



Note

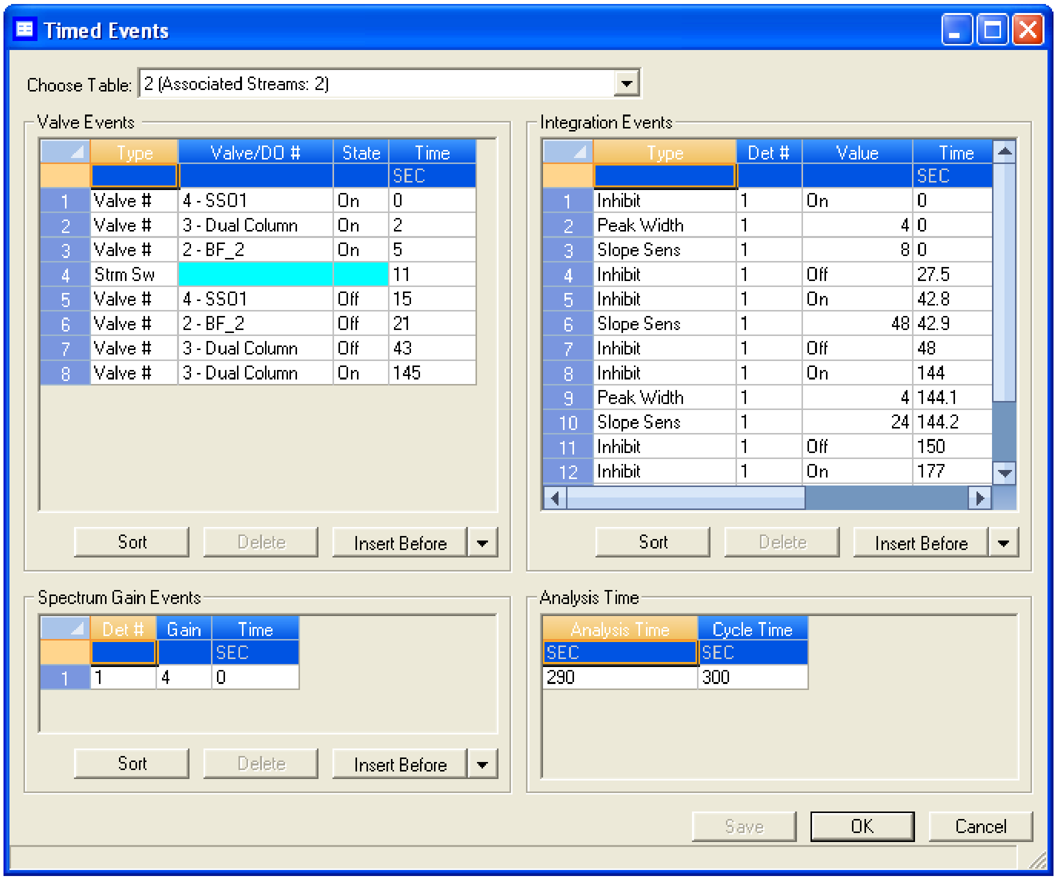
Other ways of accessing the timed event tables are by pressing **F5** or by clicking  from the Toolbar.

Note

If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-16. The Timed Events window



Note
To sort events by time, click the appropriate **Sort** button.

3. Click on the cell that you want to edit. Depending on the cell type, you will either be required to select a value from a drop-down list, or you will be able to type in the value directly.

4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

The following table describes the valve-related parameters that are available on the timed events window.

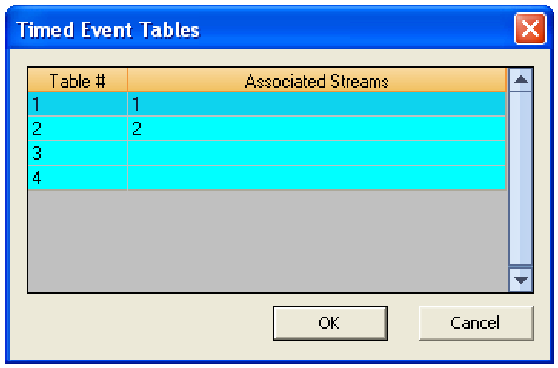
Parameter	Description
TEV Type	The type of event. You have the following choices: • **Valve #** - A valve. • **DO #** - A discrete output. • **Strm Sw** - Switches to the next stream in the sequence. • **FID Gain** - Sets the FID to high or low gain. • **FID Auto Zero** - Zeros the FID preamp after a gain change.
Valve/DO #	Use the drop-down menu to select the specific valve or discrete output that should be used for the event. This column does not apply if **Strm Sw**, **FID Gain** or **FID Auto Zero** was selected from the **TEV Type** column.
State	Turns the valve or discrete output on or off, or sets the FID to high or low. This column does not apply if **Strm Sw** or **FID Auto Zero** was selected from the **TEV Type** column.
Time	Indicates the time, in seconds, that the event should occur during the analysis. Enter a value between **0.0** and **3600.0**. **NOTE**: Event times must be less than the analysis time.

4.3.2 Editing integration events

Integration-related events are grouped on the upper right side of the Timed Events window. To edit integration-related events, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-17. The Timed Events Tables selector window



Note

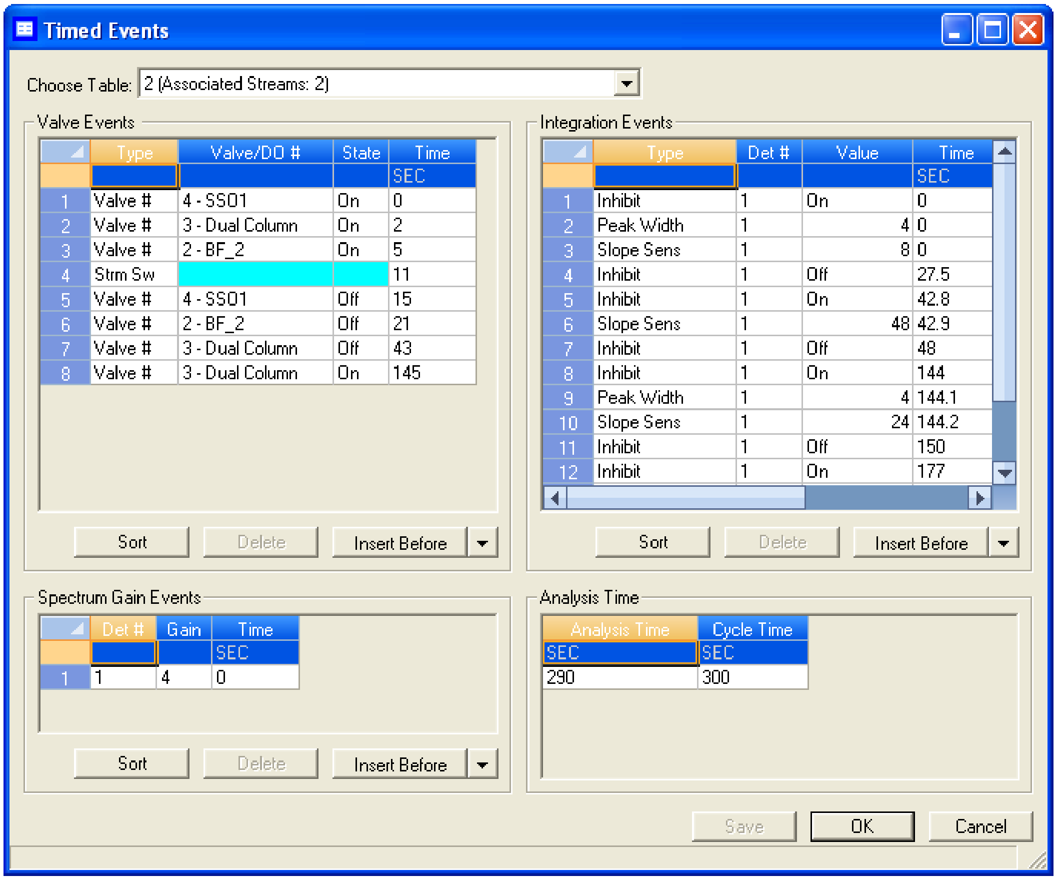
Other ways of accessing the timed event tables are by pressing F5 or by clicking  from the Toolbar.

Note

If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-18. The Timed Events window



Note
To sort events by time, click the appropriate Sort button.

3. Double-click on the cell that you want to edit. Depending on the cell type, you will either be required to select a value from a drop-down list, or you will be able to type in the value directly.
4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

The following table describes the integration-related parameters that are available on the timed events window.

Parameter	Description

TEV Type	The type of integration event. You have the following options:
	• Inhibit: Set to **Off** to start a peak; set to **On** to end a peak.
	• Integrate: Set to **On** and **Off** to set a region in which the area under the trace is computed as a peak regardless of peak onset discovery. The resulting area is added to the raw data as a peak with the retention time set to the Integration Off time.
	• Summation: Set to **On** and **Off** to set a region in which the area of all peaks found will be added together to create a single, larger, peak. The peaks that contribute to the summation are marked as partial peaks in the raw data table, and the summation total is added to the raw data as a new peak with the retention time set to the Summation OFF time.
	• Slope Sens: The peak starts when the slope of six consecutive points is greater than the slope sensitivity value that is displayed in the Value column; the peak ends when the slope of six consecutive points is less than the slope sensitivity value that is displayed in the Value column.
	• Peak Width: Each point displayed on the graph represents the average of *N* raw data points, where *N* is the value displayed in the corresponding *Value* column.
	• Single Base: Determines how the baseline is drawn under a peak.
	    • **Off**: The baseline is drawn from the point of peak onset to the point of peak termination. This is not necessarily horizontal and if fact usually has a slight slope. (Default)
	    • **Bgn**: Draws a horizontal baseline from the point of peak onset to a point above or below the peak termination.
	    • **End**: Draws a horizontal baseline from a point above or below the peak onset to the point of peak termination.
	• Fused Ovrrd: Determines how the baseline is drawn when two or more peaks are 'fused' together.
	    • **Off**: A single baseline is drawn from the onset of the first peak of the fused group to the termination of the last peak of the group. (Default)
	    • **On**: Causes a separate baseline to be drawn for each peak in the fused group.
	• Negative Peak: Determines whether peak detection will detect inverted peaks, which are peaks that point downward from the baseline. At any given moment we can detect positive or negative peaks but not both at once.
	    • **Off**: Detect positive peaks. (Default)
	    • **On**: Detective negative peaks.
	• SW Auto Zero: Re-baselines the trace at the specified time for the specified detector. Used after a FID gain change event or a spectrum gain change event.
	
	Note: The **Single Base** and **Fused Override** events can act together to produce multiple horizontal baselines, at different heights, for a fused peak group.

Parameter	Description
Value	The values available depend on the integration type selected from the **TEV Type** column. • Slope Sensitivity and Peak Width: Enter the number of points, between **1** and **99**, to be used. • Single Baseline: Select **Off**, **End**, **Bgn**. • SW Auto Zero: No options. • All other integration types: Select **On** or **Off**.
Det #	The ID number of the detector that will be affected by the event. Valid values are **1** and **2**.
Time	Indicates the time, in seconds, that the event should occur during the analysis. Enter a value between **0.0** and **3600.0**. **NOTE**: Event times must be less than the analysis time.

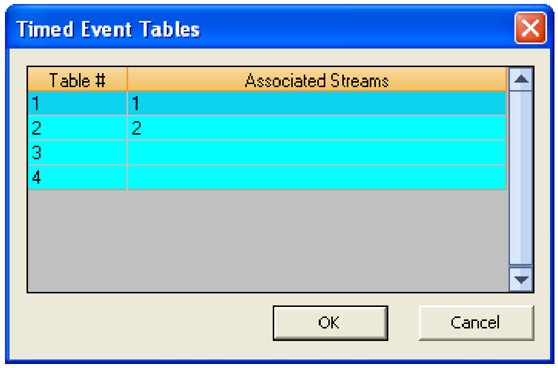
4.3.3 Editing spectrum gain events

The spectrum gain feature graphically magnifies the size of a chromatogram's peaks. The data itself is not affected; only the presentation of the data. This feature can be useful for viewing peaks that are otherwise too small to examine.

Spectrum gain-related events are grouped on the lower left side of the Timed Events window. To edit spectrum gain-related events, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-19. The Timed Events Tables selector window



Note

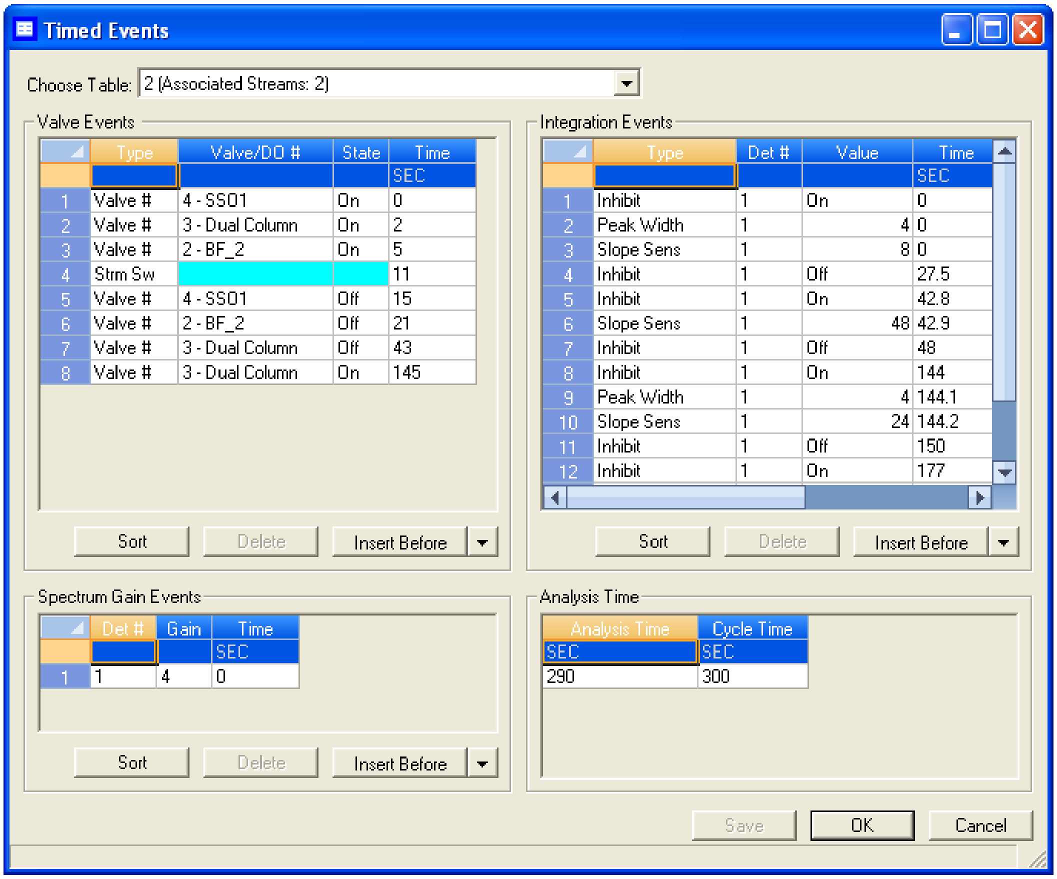
Other ways of accessing the timed event tables are by pressing F5 or by clicking  from the Toolbar.

Note

If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-20. The Timed Events window



Note
To sort events by time, click the appropriate Sort button.

3. Click on the cell that you want to edit. Depending on the cell type, you will either be required to select a value from a drop-down list, or you will be able to type in the value directly.

4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

The following table describes the spectrum gain-related parameters that are available on the timed events window.

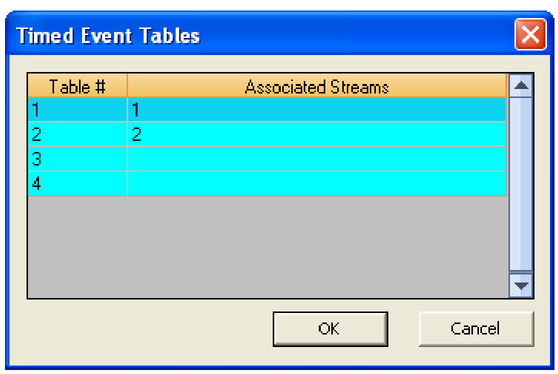
Parameter	Description
Det #	The ID number of the detector that will be affected by the event. Select **1** or **2**.
Gain	Enter a value between **0** and **64**. This is the exponent value in the following expression: $2^{gain\ value}$. For example, a value of 0 means no gain is applied; a value of 5 means the gain is increased to 32 times it's original value.
Time	Indicates the time, in seconds, that the event should occur during the analysis. Enter a value between **0.0** and **3600.0**. **NOTE**: Event times must be less than the analysis time.

4.3.4 Setting the cycle and analysis time

To set the cycle and analysis time, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-21. The Timed Events Tables selector window



Note

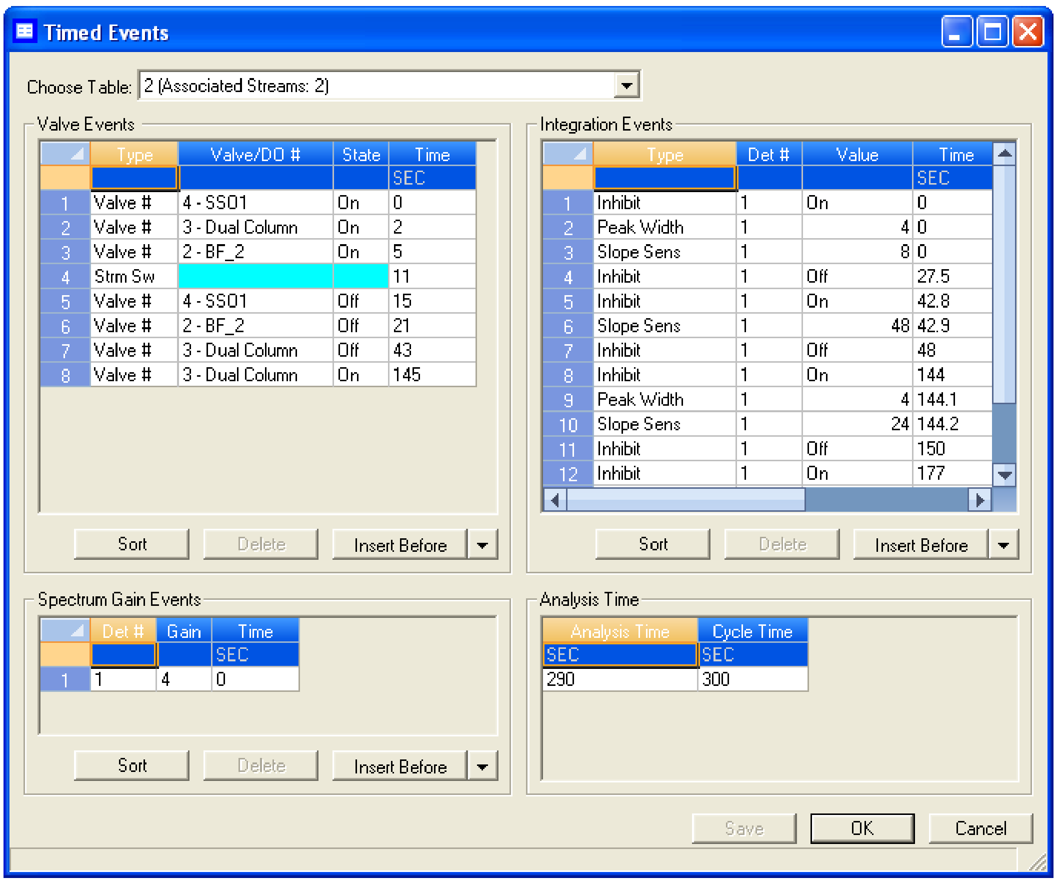
Other ways of accessing the timed event tables are by pressing F5 or by clicking  from the Toolbar.

Note
If only one timed events table is available, it will display immediately, bypassing the Timed Evetns Tables selector window.

---

2. Select the table that you want to view. The selected timed events table displays. The **Analysis Time** section is located on the lower right side of the *Timed Events* window.

Figure 4-22. The Timed Events window



Note
To sort events by time, click the appropriate Sort button.

---

3. Click on the *Analysis Time* cell and enter a value, in seconds, between **0** and **3600**.
4. Click on the *Cycle Time* cell and enter a value, in seconds, between **0** and **3620**.

Note
The Cycle Time must be atleast 10 seconds greater than the Analysis Time.

---

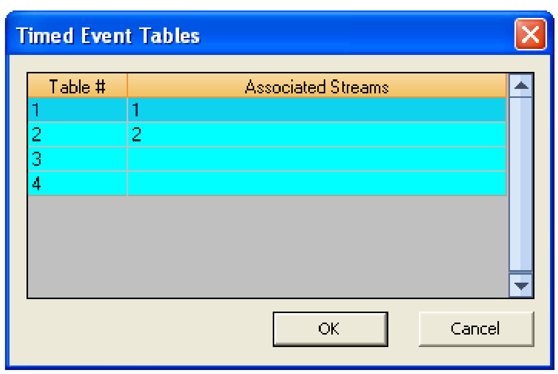
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.3.5 Removing an event from the Timed Event Table

To remove an event from one of the Valve Events, Integrate Events, or Spectrum Gain Events tables on the **Timed Events** window, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-23. The Timed Events Tables selector window



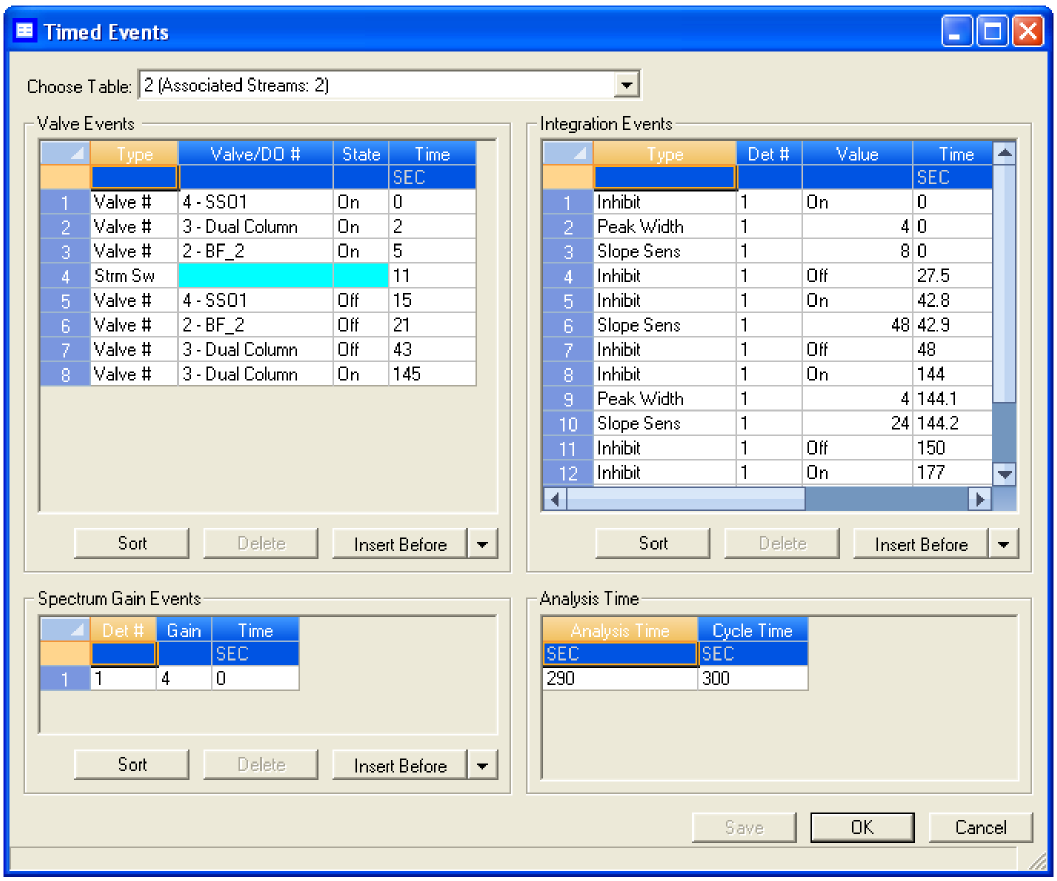
Note

Other ways of accessing the timed event tables are by pressing F5 or by clicking  from the Toolbar.

Note
If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-24. The Timed Events window



Note
To sort events by time, click the appropriate Sort button.

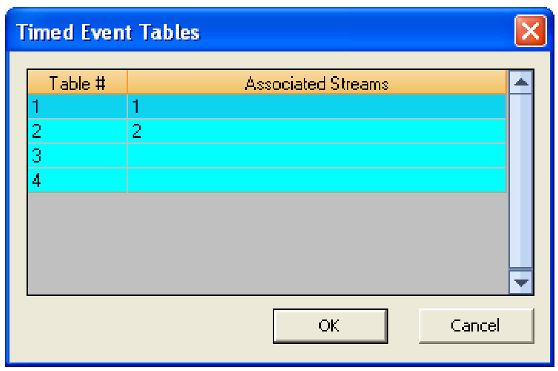
3. Select the event that you want to delete.
4. Click the appropriate **Delete** button.

4.3.6 Adding an event to the Timed Event Table

To add an event to one of the Valve Events, Integrate Events, or Spectrum Gain Events tables on the *Timed Events* window, do the following:

1. Select **Timed Events...** from the **Application** menu. The *Timed Events Tables* selector window appears, displaying a list of available timed events tables.

Figure 4-25. The Timed Events Tables selector window



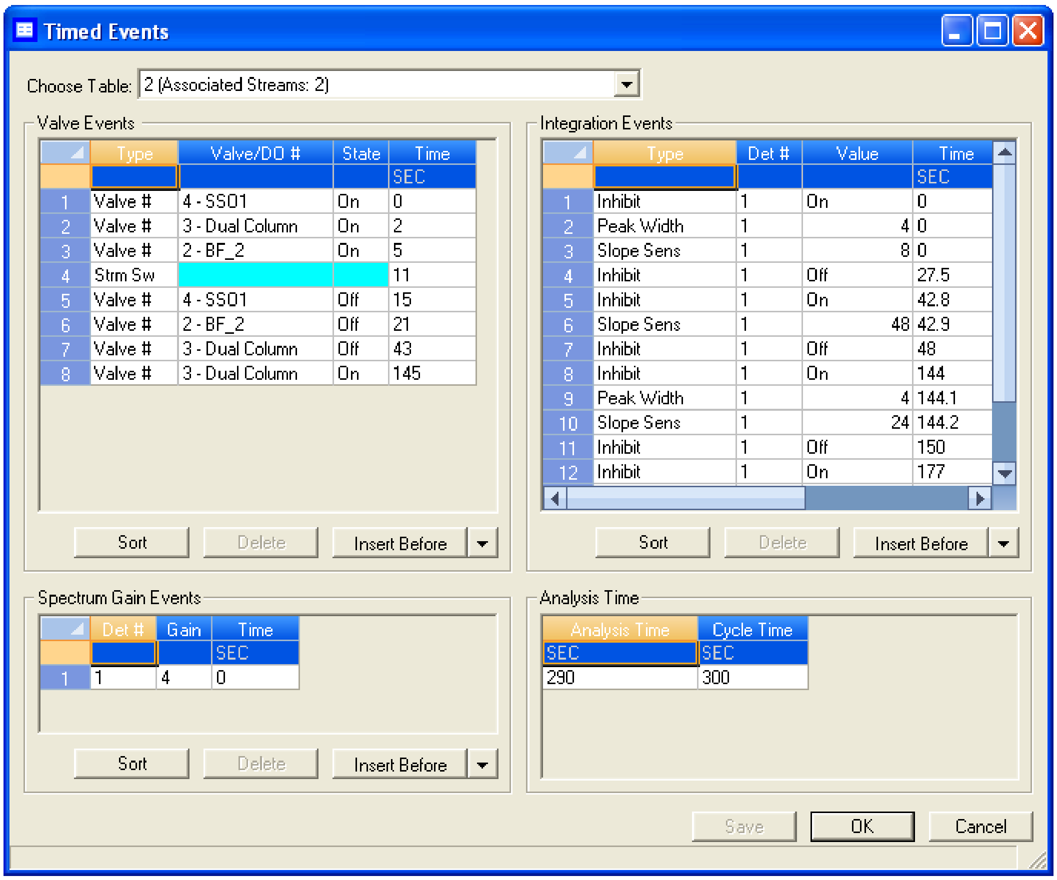
Note

Other ways of accessing the timed event tables are by pressing F5 or by clicking  from the Toolbar.

Note
If only one timed events table is available, it will display immediately, bypassing the *Timed Events Tables* selector window.

2. Select the table that you want to view. The selected timed events table displays.

Figure 4-26. The Timed Events window



> **Note**
> To sort events by time, click the appropriate Sort button.

3. If you want to add the event *above* the currently selected event, click the appropriate **Insert before** button. If you want to add the event *below* the currently selected event, select **Insert after** from the **Insert** arrow and then click the button.

The new event will be added to the table.

4. Select a *Type*, *Valve/DO#*, and *State* for the event, if necessary, and enter a new *Time* for the event also.
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

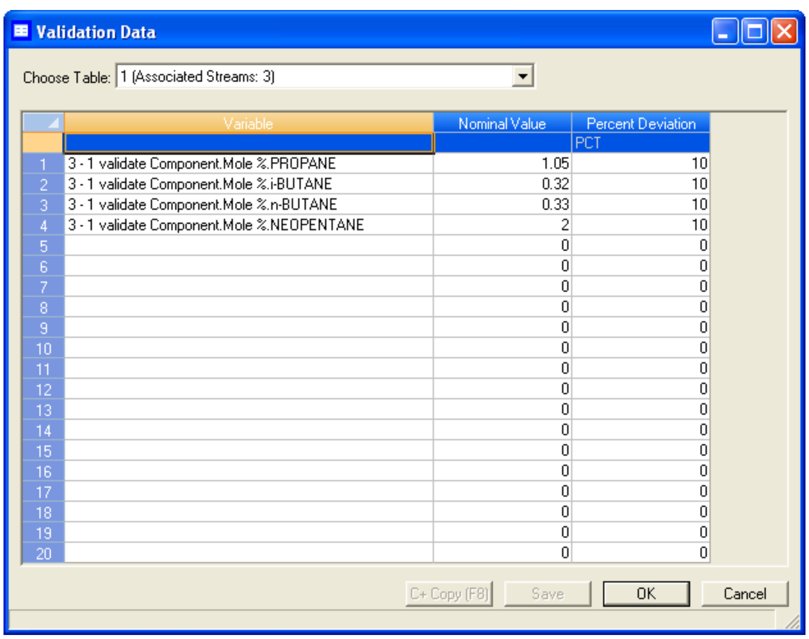
4.4 Managing Validation Data Tables

Use the validation data table to hold information about the composition of the gas that is used in the validation run. During a validation run, the GC performs a test analysis of a gas with a known component composition to verify that the GC is working properly.

To add a component to the validation data table, do the following:

1. Select **Validation Data** from the **Application** menu. The *Validation Data* window displays.

Figure 4-27. The Validation Data window

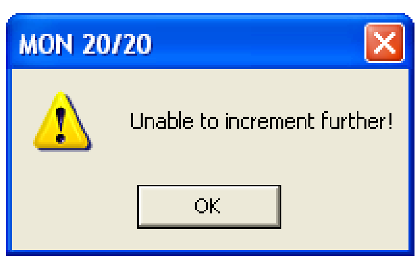


2. If the appropriate table is not displayed, select it from the *Choose Table* drop-down list.
3. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.
4. Enter the component's concentration percentage in the appropriate cell under the *Nominal Value* column. To ensure accuracy, this value, which is compared to the GC's analysis results at the end of the validation run, should be taken from the documentation provided with the gas cylinder.
5. Enter a value in the appropriate *Percent Deviation* cell. If you enter **10** in this field, and the GC's analysis result for the component differs from the component's *Nominal Value* by ±10% or more, then an alarm is generated.
6. To copy a component variable to the next empty row, click **C + Copy**. The component will be increment to the next available component—for example, from Ammonia to Benzene. The *Nominal Value* and *Percent Deviation* values will also be copied.

Note
You can select and copy more than one component at a time.

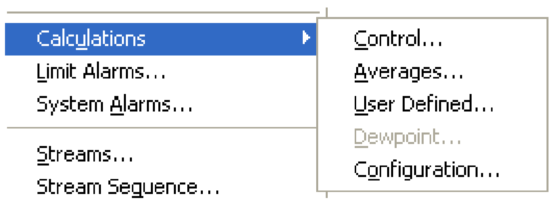
If there are no components available, instead of copying the component, MON 20/20 will display the following message:

Figure 4-28. No components warning



7. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.5 Managing calculations



MON 20/20's **Calculations** submenu allows you to activate and define how the output of standard or user-defined chromatograph analysis data is used in various calculations.

You can configure the following types of calculations:

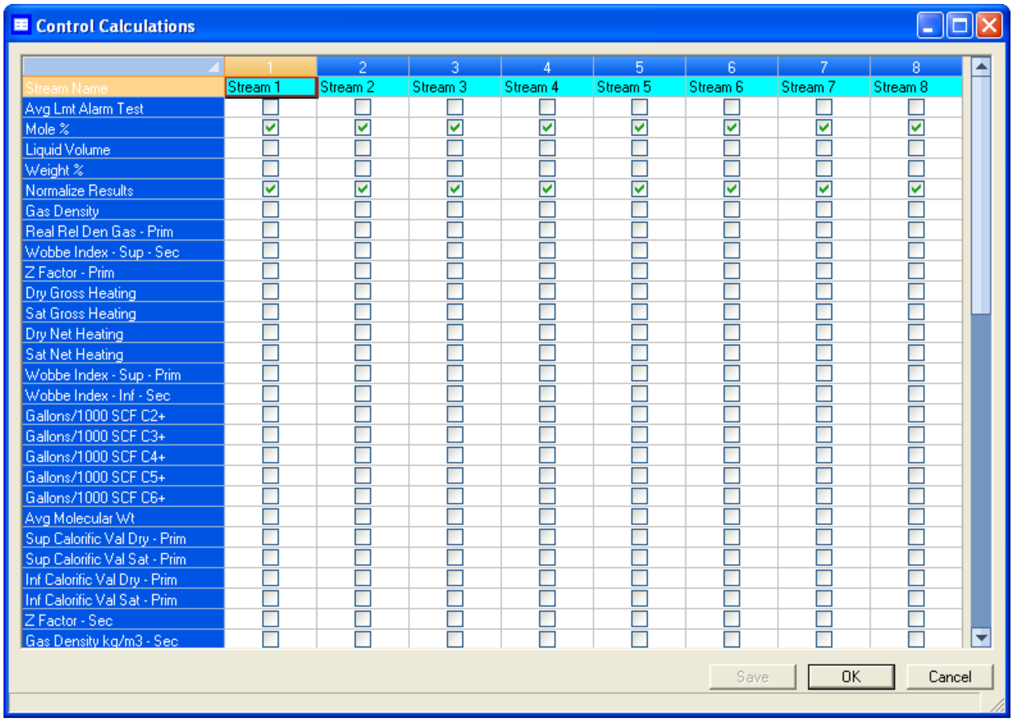
- **Control** - Allows you to designate, by streams, the standard calculations that should be performed from the analysis data.
- **Averages** - Allows you to designate, by streams and components, averages of standard calculations MON 20/20 should perform.
- **User Defined** - Allows you to create and edit customized calculations using analysis data.
- **Dewpoint** - This optional feature allows you to calculate dewpoint temperatures and to estimate the cricondentherm, which is the temperature above which no liquid will form at any pressure.

4.5.1 Setting standard calculations by stream

To designate, by streams, the standard calculations—for example, mole percent, liquid volume, gas density, Wobbe index, etc.—that should be performed from the analysis data, do the following:

1. Select **Applications** → **Calculations** → **Control...**. The *Control Calculations* window appears.

Figure 4-29. The Control Calculations window



2. Select a check box for a given stream to turn the calculation ON for that stream; click to clear the check box for a given stream to turn the calculation OFF for that stream.

   You can use the arrow keys to move from one stream cell to another, and you can press the space bar to toggle the calculation on or off.

3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

Note
To save the information on this screen to a tab-delimited text file, right-click on the table and select Save Sheet from the right-click menu.

Note
To copy the information on this screen to the clipboard so that it can be pasted into another application such Microsoft Word or Excel, right-click on the table and select **Copy** to clipboard from the right-click menu.

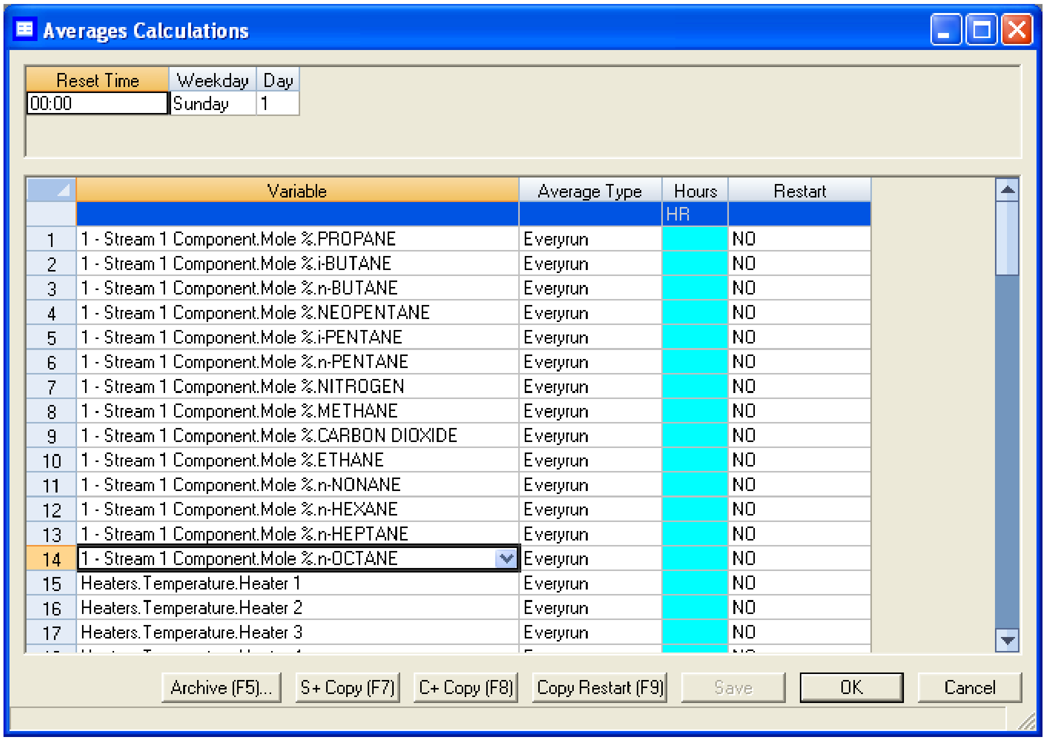
Note
To print the information on this screen, right-click on the table and select **Print Sheet** from the right-click menu.

4.5.2 Editing average calculations

To designate, by streams and components, averages of standard calculations the GC should perform, do the following:

1. Select **Applications** → **Calculations** → **Averages...**. The *Averages Calculations* window appears.

Figure 4-30. The Averages Calculations window



2. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

3. Select the type of average to be calculated from the *Average Type* drop-down list. You have the following options:
   - **Unused** - An average will not be calculated for the variable.
   - **Hourly** - Averages will start and stop every hour, beginning at the time displayed in the *Reset Time* field from the **Averages Reset** section.
   - **24 Hour** - Averages will start and stop once a day at the time displayed in the *Reset Time* field from the **Averages Reset** section.

- **Weekly** - Averages will start and stop once a week at the time displayed in the *Reset Time* field and on the day entered in the *Weekday* field, from the **Averages Reset** section.
- **Monthly** - Averages will start and stop once a month at the time displayed in the *Reset Time* field and on the day of the month entered in the *Day* field, from the **Averages Reset** section.
- **Variable** - Averages will start and stop every hour at the time entered in the *Hours* column, instead of at the Reset Time.
- **Everyrun** - No average will be stored; instead, the current value at the end of the run will be stored.

4. To set a custom start and stop time for a particular calculation, set the *Average Type* for the calculation to **Variable** and enter the desired time in the *Hours* cell.

Note
The custom *Hours* setting overrides the *Reset Time* setting.

---

5. Set the appropriate **Restart Flag** to one of the following options:
   - **NO** - The current average will not be reset.
   - **CUR** - The current average will be cleared and a new average calculation will start.
6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

Note
To save the information on this screen to a tab-delimited text file, right-click on the table and select Save Sheet from the right-click menu.

Note
To copy the information on this screen to the clipboard so that it can be pasted into another application such Microsoft Word or Excel, right-click on the table and select Copy to clipboard from the right-click menu.

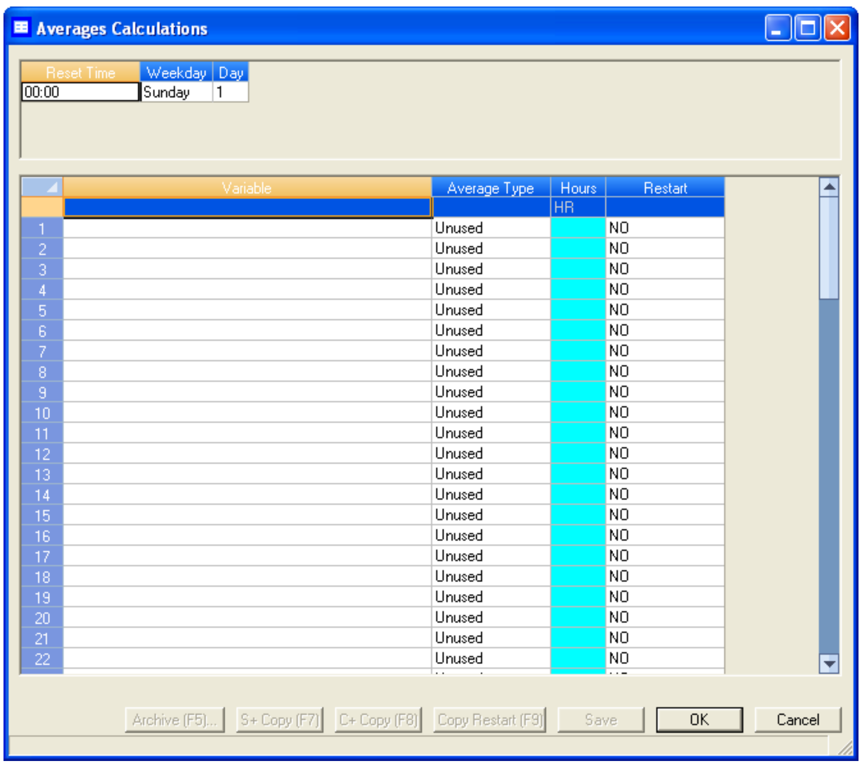
Note
To print the information on this screen, right-click on the table and select Print Sheet from the right-click menu.

4.5.3 Viewing an archive of averages for a given variable

To view an archive of averages for a given variable, do the following:

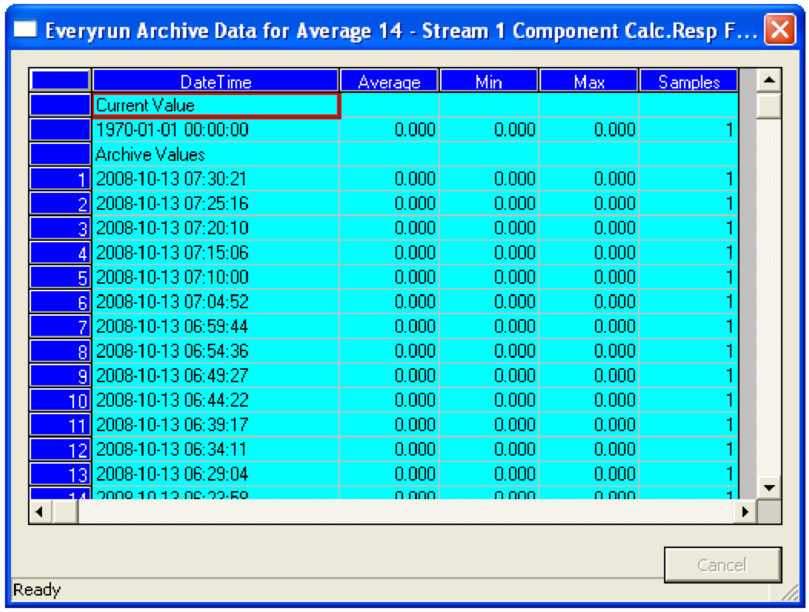
1. Select **Applications** → **Calculations** → **Averages...**. The *Averages Calculations* window appears.

Figure 4-31. The Averages Calculations window



2. Click on the desired variable to view its history.
3. Click **Archive**. The archive data screen appears.

Figure 4-32. The archive data window



Note

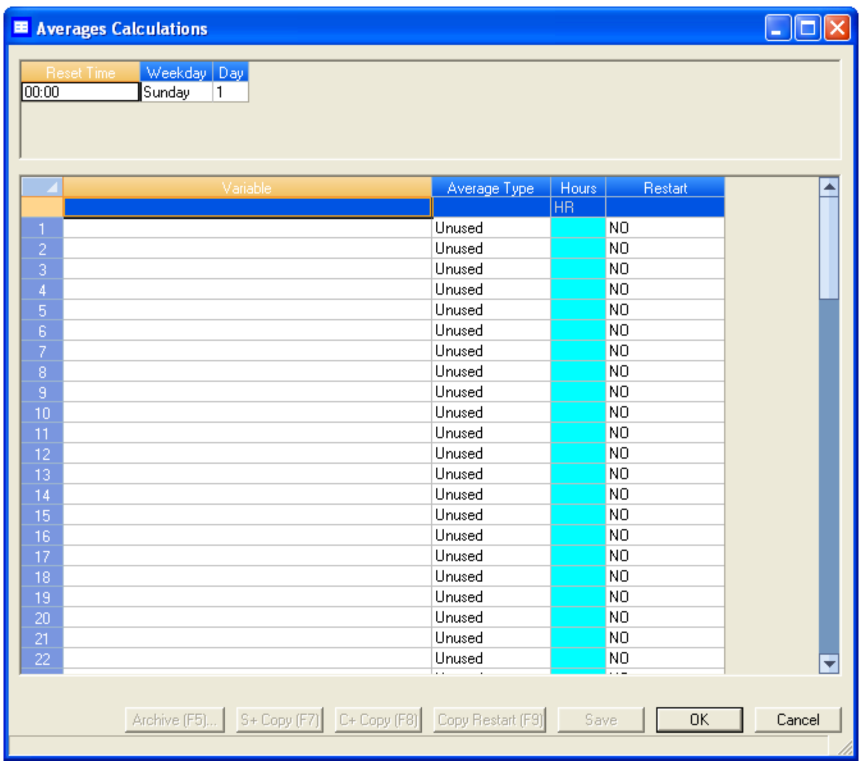
To copy the information in this table to the clipboard so that it can be pasted into another application such as Microsoft Word or Excel, select the cells that you want to copy and then press CTRL + C to copy the information to the clipboard.

4.5.4 Copying stream settings

To copy the stream settings from a highlighted row and apply them to the next row, do the following:

1. Select **Applications** → **Calculations** → **Averages...**. The *Averages Calculations* window appears.

Figure 4-33. The Averages Calculations window

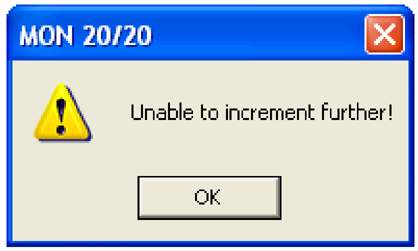


2. Select the row that you want to copy.
3. Click **S + Copy**. The stream will be copied to the next row and incremented to the next available stream—for example, from Stream 2 to Stream 3.

Note
You can select and copy more than one stream at a time.

If there are no streams available, instead of copying the stream, MON 20/20 will display the following message:

Figure 4-34. No streams available warning



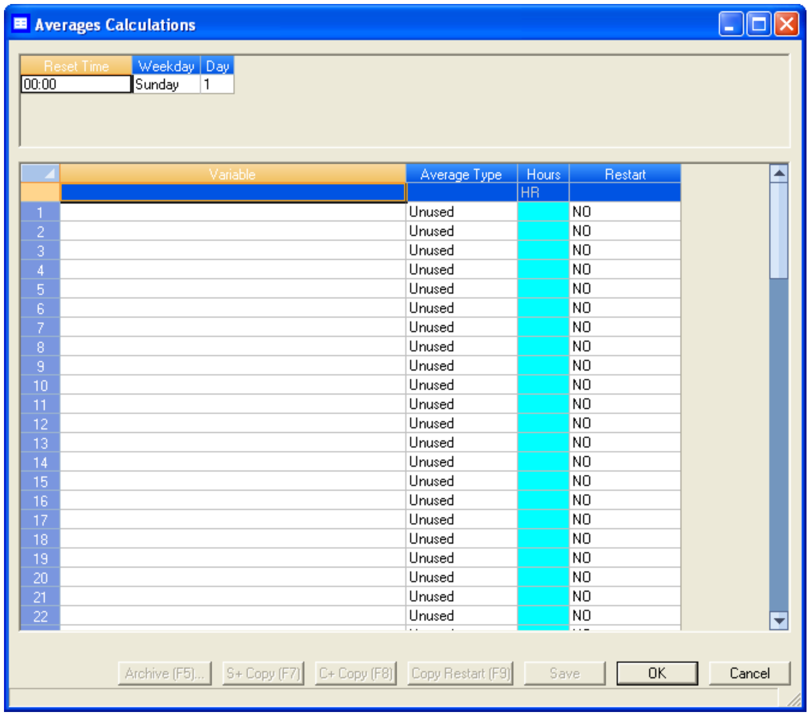
4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.5.5 Copying component settings

To copy the component settings from a highlighted row and apply them to the next row, do the following:

1. Select **Applications** → **Calculations** → **Averages...**. The *Averages Calculations* window appears.

Figure 4-35. The Averages Calculations window

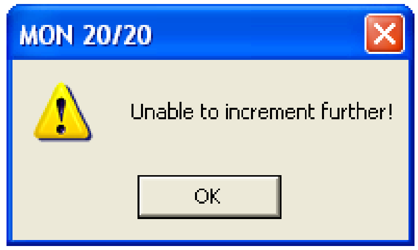


2. Select the row that contains the component that you want to copy.
3. Click the arrow beside the **S + Copy** button to switch it to **C + Copy**.
4. Click **C + Copy**. The component will be copied to the next row and incremented to the next available component—for example, from Ammonia to Benzene.

Note
You can select and copy more than one component at a time.

If there are no components available, instead of copying the component, MON 20/20 will display the following message:

Figure 4-36. No components available warning



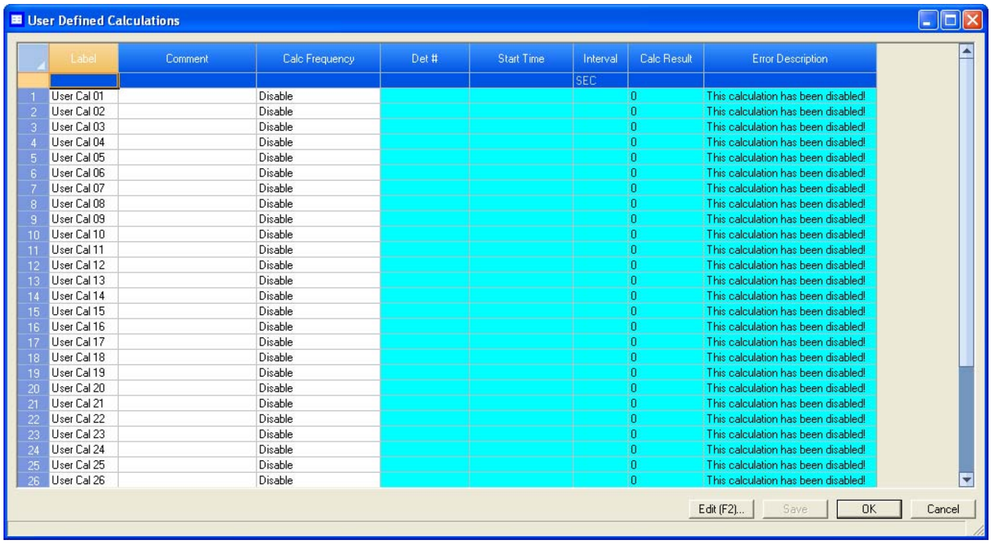
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.6 Creating Custom Calculations

To create or edit a customized calculation using GC analysis data, do the following:

1. Select **Applications** → **Calculations** → **User Defined...**. The *User Defined Calculations* window appears, containing a list of all the user-defined calculations that are available to the GC.

Figure 4-37. The User Defined Calculations window


User Defined Calculations

	Label	Comment	Calc Frequency	Det #	Start Time	Interval	Calc Result	Error Description
						SEC		
1	User Cal 01		Disable				0	This calculation has been disabled!
2	User Cal 02		Disable				0	This calculation has been disabled!
3	User Cal 03		Disable				0	This calculation has been disabled!
4	User Cal 04		Disable				0	This calculation has been disabled!
5	User Cal 05		Disable				0	This calculation has been disabled!
6	User Cal 06		Disable				0	This calculation has been disabled!
7	User Cal 07		Disable				0	This calculation has been disabled!
8	User Cal 08		Disable				0	This calculation has been disabled!
9	User Cal 09		Disable				0	This calculation has been disabled!
10	User Cal 10		Disable				0	This calculation has been disabled!
11	User Cal 11		Disable				0	This calculation has been disabled!
12	User Cal 12		Disable				0	This calculation has been disabled!
13	User Cal 13		Disable				0	This calculation has been disabled!
14	User Cal 14		Disable				0	This calculation has been disabled!
15	User Cal 15		Disable				0	This calculation has been disabled!
16	User Cal 16		Disable				0	This calculation has been disabled!
17	User Cal 17		Disable				0	This calculation has been disabled!
18	User Cal 18		Disable				0	This calculation has been disabled!
19	User Cal 19		Disable				0	This calculation has been disabled!
20	User Cal 20		Disable				0	This calculation has been disabled!
21	User Cal 21		Disable				0	This calculation has been disabled!
22	User Cal 22		Disable				0	This calculation has been disabled!
23	User Cal 23		Disable				0	This calculation has been disabled!
24	User Cal 24		Disable				0	This calculation has been disabled!
25	User Cal 25		Disable				0	This calculation has been disabled!
26	User Cal 26		Disable				0	This calculation has been disabled!

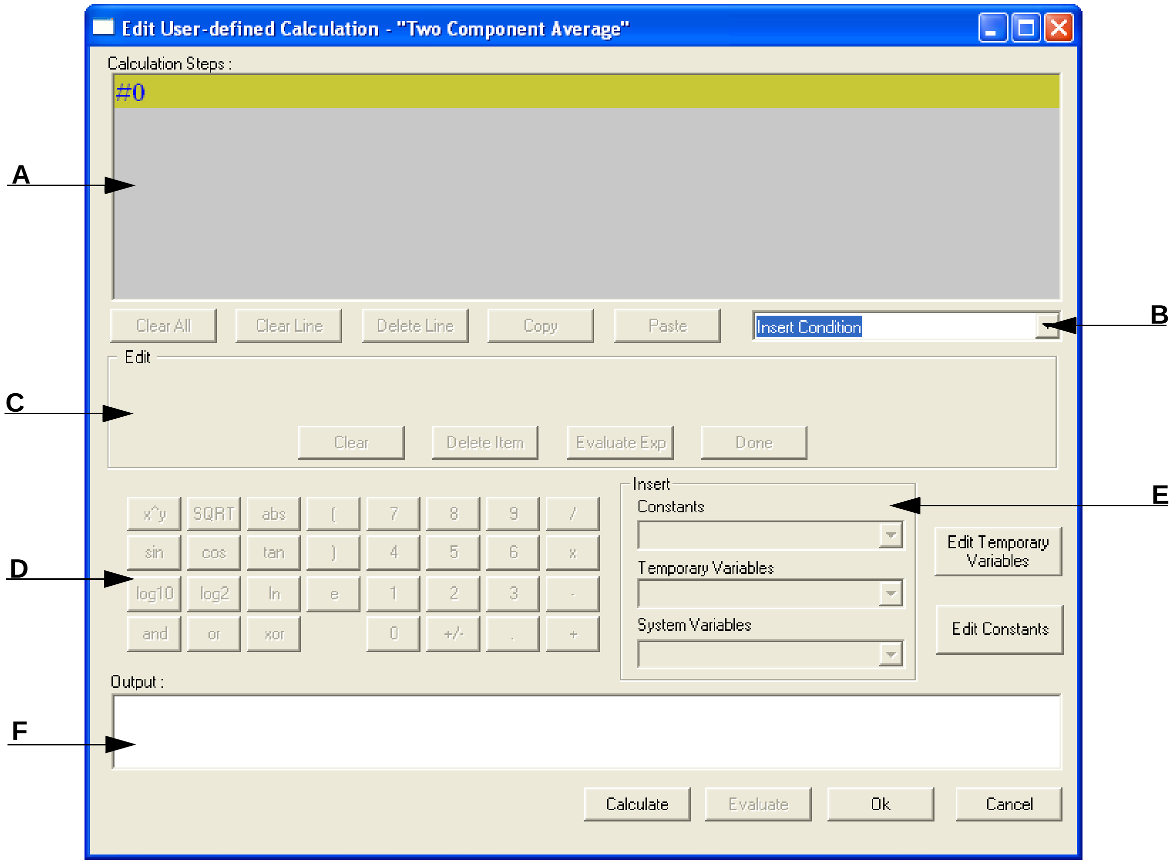
Edit (F2)... Save OK Cancel

2. Click **Insert before** to add a row to the *User Defined Calculations* table.

Note
To delete this--or any--row from the table, click **Delete.**

3. Double-click the *Label* cell and enter a name for the calculation you are about to create. If you want to enter a short description for the new calculation, double-click the *Comment* cell and enter it there.
4. Click **Edit**. The *Edit User-defined Calculation* window appears.

Figure 4-38. The Edit User-defined Calculation window



In MON 20/20, building a calculation is similar to building a simple program. You have constants and two types of variables available, as well as two calculation-building commands. You can also add comments that will be ignored by the application but that can help you explain the logic and structure of the calculation you are designing.

The following is a description of the design elements of the *Edit User-defined Calculation* window:

- Element **A** - Called the **Calculation Steps Viewer**, this element displays the line-by-line construction of the calculation as it is being built. The following commands allow you to interact with this area:
  - Click **Clear All** to clear the content of the Calculation Steps Viewer.
  - Click **Clear Line** to clear the content of the selected line.

Note

If the selected line is an "If-Then" statement, then the entire condition is cleared. This button is disabled when the cursor is on an "else" or "endif" condition.

  - Click **Delete Line** to delete the selected line.

Note

If the selected line is the beginning of a conditional statement, then the entire "If-Then" block will be deleted along with the expressions that constitute the "If-Then" construct. If the selected line is part of the conditional "If-Then" construct—that is, the line only has "Else" or "Endif" in it—then the entire "If-Then" construct will be deleted.

  - Click **Copy** to copy the selected line to the clipboard. You cannot copy keywords such as "**else**" or "**endif**."
  - Click **Paste** to paste the content of the clipboard into a selected line. If the line already has a calculation in it, it is cleared before the content of the clipboard is pasted into it.
- Element **B** - A drop-down menu with the following three commands:
  - **Insert Comment** - Adds a comment to the calculation. Each comment is preceded by "//."
  - **Insert Condition** - Adds an "If-Then" statement to the calculation.
  - **Insert Expression** - Adds a mathematical expression to the calculation.
- Element **C** - Also called the **Expression Editor**, this section is the work area where the comment, condition or expression is built before being added to the Calculation Steps Viewer. There are four modes of the Expression Editor, depending upon what action is being performed:

Figure 4-39. Expression Editor - No Action

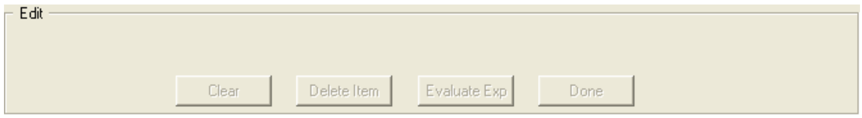


Figure 4-40. Expression Editor - Insert Comment

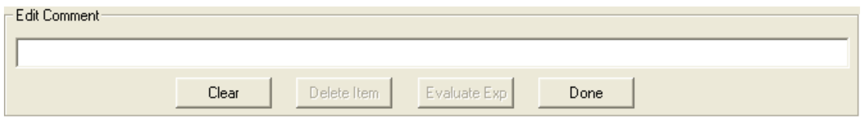


Figure 4-41. Expression Editor - Insert Condition

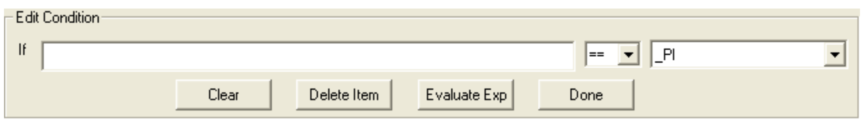
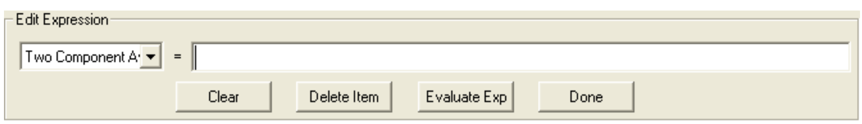


Figure 4-42. Expression Editor - Insert Expression



The following commands allow you to interact with the Expression Editor:

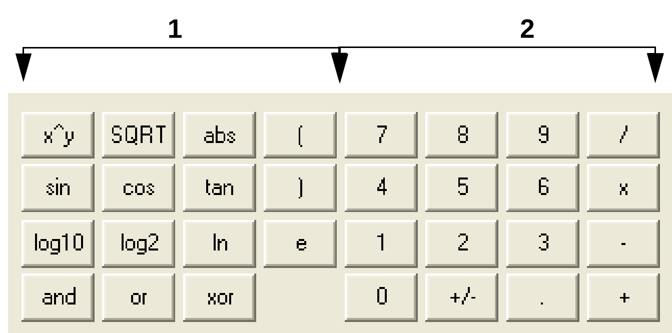
- Click **Clear** to clear the content of the entire line. The line itself is not deleted.
- Click **Delete Item** to delete the currently active token. Each mathematical function, numeric data, and mathematical operation is treated as a token. The token to the right of the current cursor location is treated as the currently active token.
- Click **Evaluate Exp** to check the validity of the expression. If any errors are detected in the syntax, then an error will be reported in the Output window.

Note
This button is only active when the line being edited is an expression.

- Click **Done** to evaluate the expression and copy it to the Calculations Steps Viewer. If there are any errors in the expression, they are reported in the Output window.

- Element **D** - This section contains calculator functions that can be used to build a mathematical expression. This section can be divided into two parts:

Figure 4-43. Calculator functions



- **Section 1** - This section contains the following keys:

x^y	x to the power of y
SQRT	Square Root
abs	Absolute Value
sin	Sine
cos	Cosine
tan	Tan
log10	Logarithm to the base 10
log2	Logarithm to the base 2
ln	Logarithm to the base e
and	Logical AND
or	Logical OR
xor	Logical XOR
(	Open bracket
)	Close bracket

- **Section 2** - This section contains the traditional calculator keys and can be used with your keyboard's **Numpad**.

Note
Make sure to engage your keyboard's Numlock before using the Numpad.

- Section **E** - This section contains drop-down menus and buttons that allow you to create and select constants and variables that can be added to your mathematical expressions.

- **Constants** - Allows you to select constants from a drop-down list.
- **Temporary Variables** - Allows you to select temporary, user-created variables from a drop-down list.
- **System Variables** - Allows you to select system variables.
- **Edit Temporary Variables** - Allows you to create variables.
- **Edit Constants** - Allows you to create system-wide constants that can be used in user-defined calculations.

- Section **F** - This section, called the **Output Display**, displays status information.

5. Use the following procedures to build your calculation in the Calculation Steps Viewer:

- "Inserting a Comment" on page 4-54
- "Inserting a Conditional Statement" on page 4-56
- "Inserting an Expression" on page 4-59
- "Creating a Constant" on page 4-61
- "Creating or Editing a Temporary Variable" on page 4-63
- "Inserting a System Variable" on page 4-64
- "Using User-defined Calculations" on page 4-65

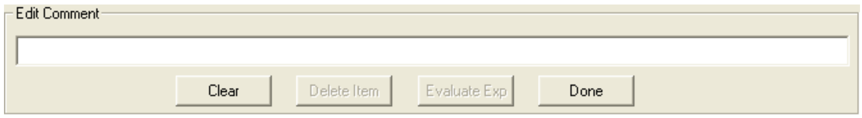
6. To see the result of the calculation, click **Calculate**. The results display in the **Output** window. To validate the calculation for errors, click **Evaluate**. The results of the validation check display in the **Output** window. To save the calculation and to close the *Edit User-defined Calculation* window, click **OK**.
7. On the *User Defined Calculations* window, to save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.6.1 Inserting a Comment

To add a comment to the calculation, do the following:

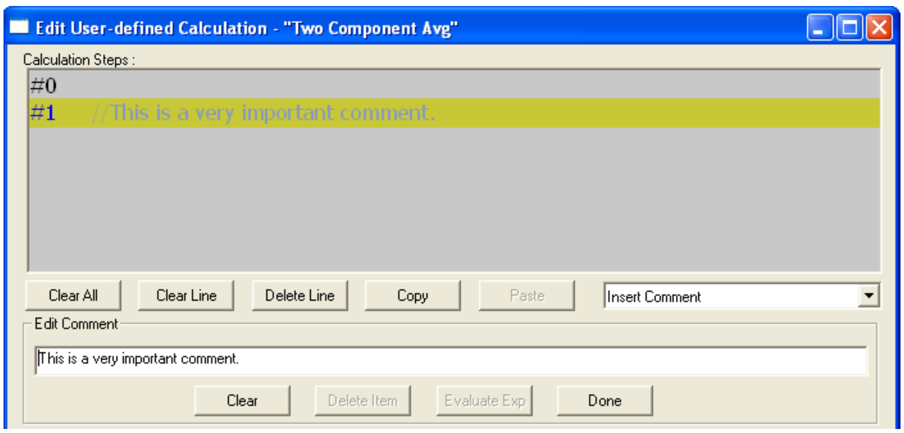
1. Click on the *Insert* drop-down list and select **Insert Comment**. A new line will be added to the **Calculation Steps Viewer** and the **Expression Editor** will switch to *Edit Comment* mode.

Figure 4-44. Edit Comment mode



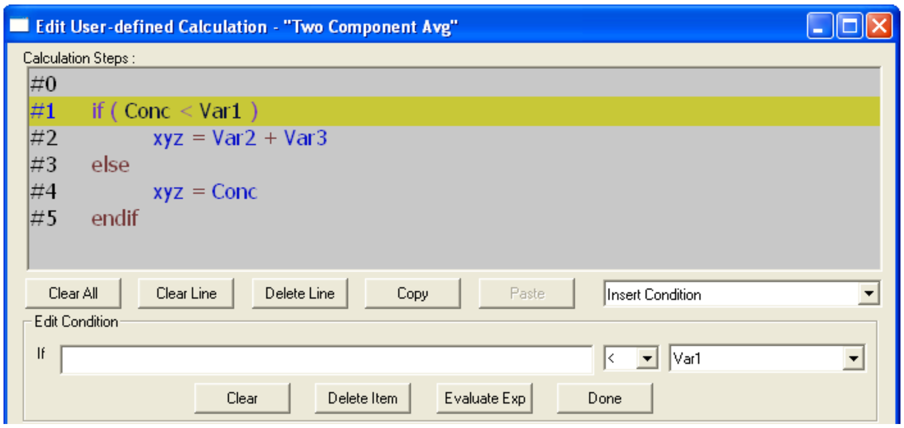
2. Enter the comment into the *Edit Comment* textbox and then click **Done**. The comment will be added to the **Calculation Steps Viewer**.

Figure 4-45. Calculation Steps Viewer



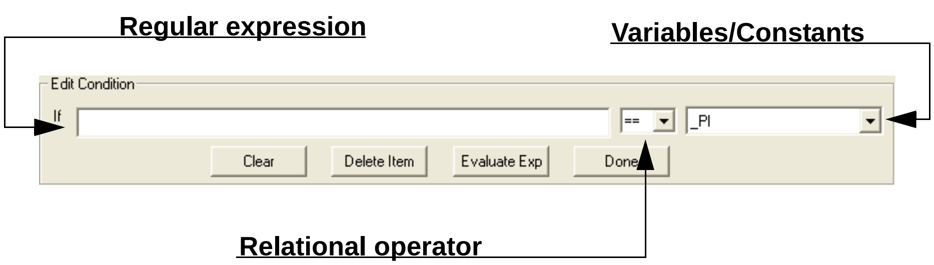
4.6.2 Inserting a Conditional Statement

Figure 4-46. An example of a conditional statement



The **Expression Editor** in *Edit Condition* mode allows you to build the first line of the conditional statement:

Figure 4-47. The Expression Editor in Edit Condition mode

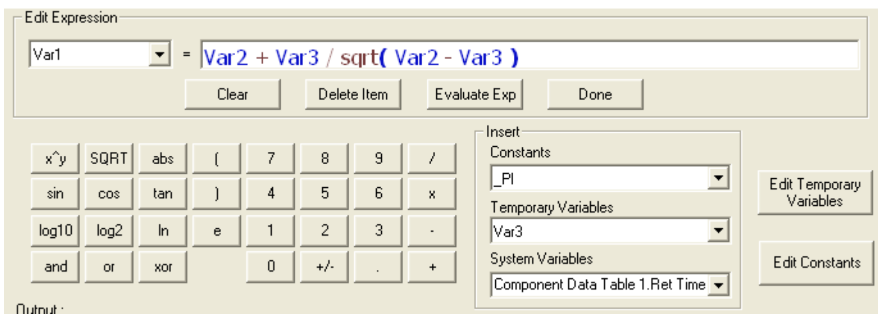


Expressions are built using the **Expression Editor** in *Edit Expression* mode.

To add a conditional statement, do the following:

1. Click on the *Insert* drop-down list and select **Insert Condition**. A new line is added to the **Calculation Steps Viewer** and the **Expression Editor** switches to *Edit Condition* mode.
2. Add an expression. You can use constants, temporary variables, system variables, and the calculator functions to build the expression. For information on inserting system variables, see page 4-64. For information on creating variables, see page 4-63. For information on creating constants, see page 4-61.

Figure 4-48. Edit Expression area

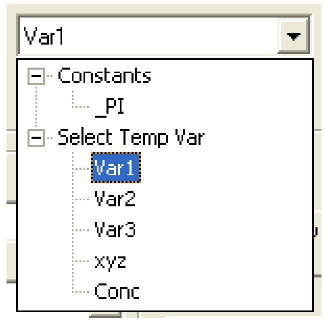


3. Select a relational operator from the drop-down list. You have the following options:

<	Less than
<=	Less than or equal
>	Greater than
>=	Greater than or equal
==	Equal
!=	Not equal

4. To add a variable or constant to the expression, click the *Variable/ Constant* drop-down list and select the appropriate item.

Figure 4-49. the Variable/Constant drop-down list



For information on creating variables, see page 4-63. For information on creating constants, see page 4-61.

5. Click **Done**. MON 20/20 validates the statement and if there are no errors, it adds it to the Calculation Steps Viewer.

Figure 4-50. Calculation Steps Viewer

To complete the conditional statement, use the **Expression Editor** in *Edit Expression* mode to add the necessary mathematical expressions.

4.6.3 Inserting an Expression

A mathematical expression has the following structure:

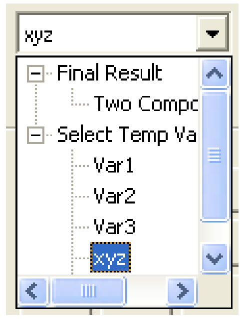
Variable = Regular expression

Figure 4-51. Edit Expression area

To add an expression to a conditional statement or calculation, do the following:

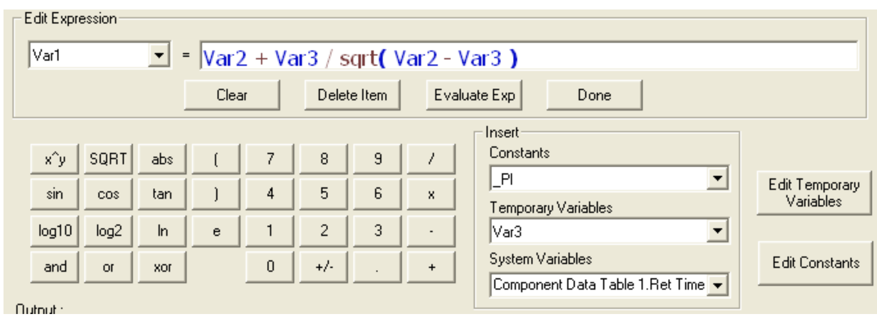
1. Click on the *Insert* drop-down list and select **Insert Expression**. A new line is added to the **Calculation Steps Viewer** and the **Expression Editor** switches to *Edit Expression* mode.
2. Select a variable from the *Variable* drop-down tree view. You can select either a temporary variable or you can set the expression you are building as the final result of your new user-defined calculation. For instance, if the user-defined calculation you are building is called 'User Calc 1,' then you can select **User Calc 1** from the **Final Result** tree view. For information on creating variables, see "Creating or Editing a Temporary Variable" on page 4-63.

Figure 4-52. The Final Result tree view



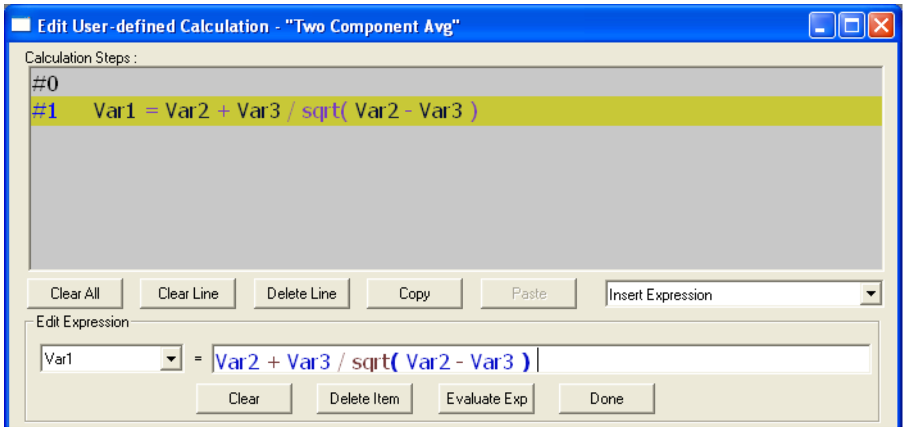
3. Add a regular expression. You can use constants, temporary variables, system variables, and the calculator functions to build the expression. For information on inserting system variables, see page 4-64. For information on creating variables, see page 4-63. For information on creating constants, see page 4-61.

Figure 4-53. The Edit Expression area



4. Click **Done**. MON 20/20 validates the statement and if there are no errors, it adds it to the **Calculation Steps Viewer**.

Figure 4-54. The Calculation Steps Viewer

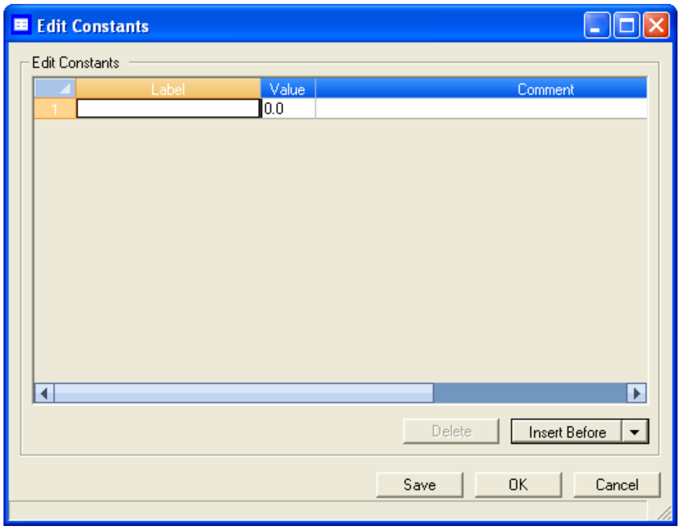


4.6.4 Creating a Constant

To create a constant that you can use in building a calculation, do the following:

1. From the *Edit User-defined Calculation* window, click **Edit Constants**. The *Edit Constants* window displays, showing all the constants that have been created so far for the GC.

Figure 4-55. The Edit Constants window



2. To create a new constant, click **Insert before**. A new row will be added to the *USER_CALC_CONSTANTS* table.

Note
To delete a constant, select it in the table and click Delete.

3. Double-click the *Label* cell and enter a name for the constant.

Note
To edit any cell, double-click it.

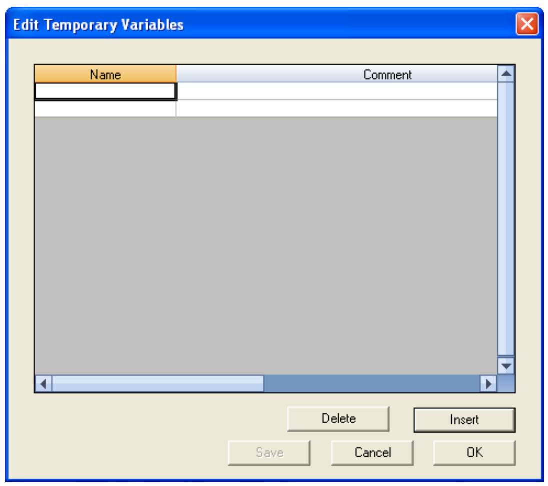
4. Double-click the *Value* cell and enter a value for the constant.
5. Use the *Comment* cell to store information that is relevant for the constant.
6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.6.5 Creating or Editing a Temporary Variable

To create a temporary variable that you can use in building a calculation, do the following:

1. From the *Edit User-defined Calculation* window, click **Edit Temporary Variables**. The *Edit Temporary Variables* window displays, showing all the temporary variables that have been created so far for the user-defined calculation.

Figure 4-56. The Edit Temporary Variables window



2. To create a new temporary variable, click **Insert**. A new row will be added to the table.

Note
To delete a variable from this window, select it in the table and click Delete.

3. Double-click the *Name* cell and enter a name for the variable.
4. Use the *Comment* cell to store information that is relevant for the variable.
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.6.6 Inserting a System Variable

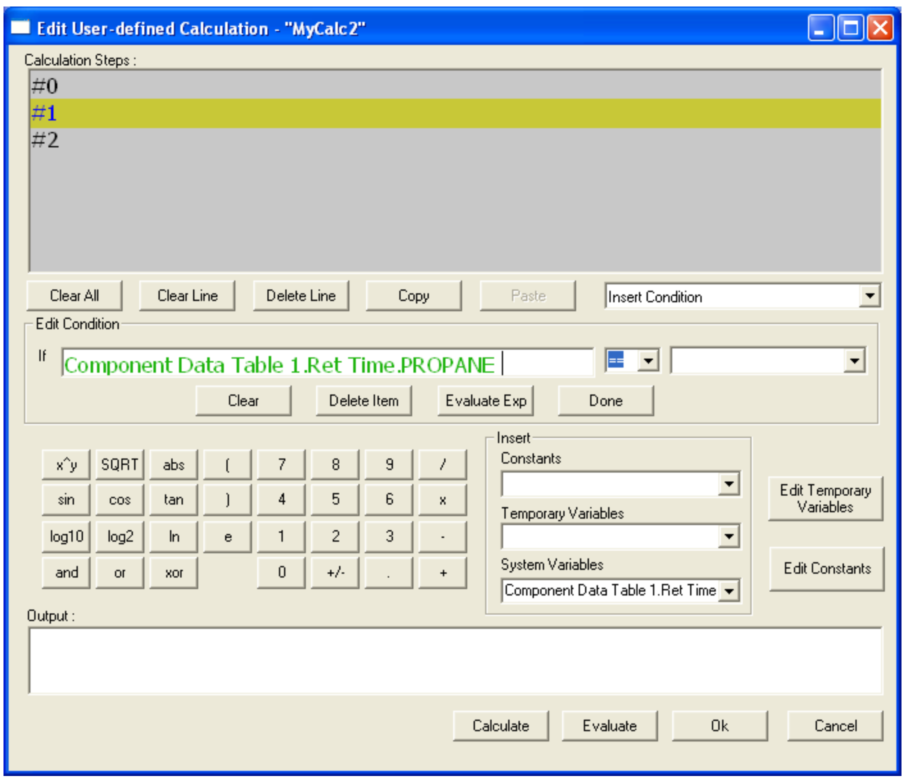
To insert a system variable into the Expression Editor, do the following:

From the *Edit User-defined Calculation* window, click on the *System Variables* drop-down arrow.

For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

The selected system variable displays in the *System Variables* drop-down box and in the **Expression Editor**.

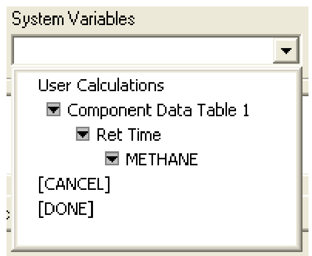
Figure 4-57. The Expression Editor



4.6.7 Using User-defined Calculations

You can use a previously-created user-defined calculation when building new calculations by clicking on the *System Variables* drop-down arrow on the *Edit User-defined Calculation* window.

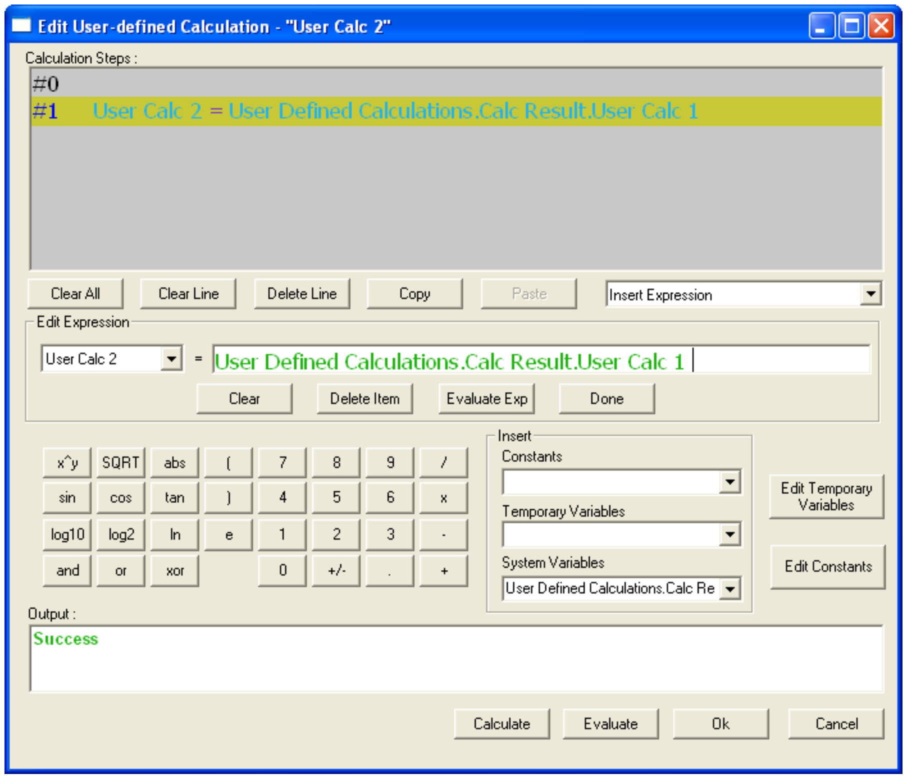
Figure 4-58. System Variables drop-down menu



For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

The selected system variable displays in the *System Variables* drop-down box and in the **Expression Editor**.

Figure 4-59. The Expression Editor



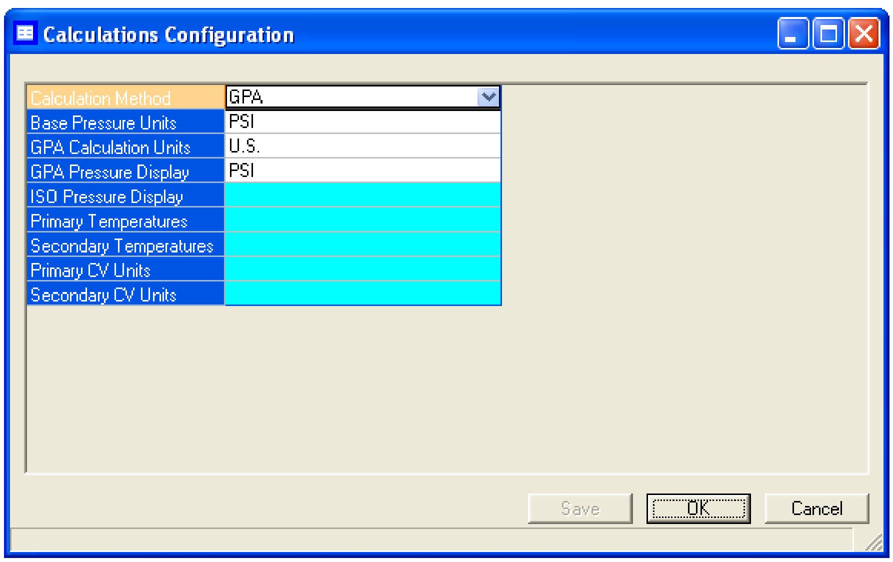
4.7 Setting the calculation method

MON 20/20 can be configured to perform GPA calculations, ISO calculations, or both.

To set which type of calculation method MON 20/20 should use, do the following:

1. Select **Applications** → **Calculations** → **Configuration...**. The *Calculations Configuration* window displays.

Figure 4-60. The Calculations Configuration window



2. Select the method from the *Calculation Method* drop-down list. The options are:
   - GPA
   - ISO
   - GPA & ISO

3. Select a unit of measure from the *Base Pressure Units* drop-down list. The options are:
   - PSI
   - Bar
   - kPa
4. If you set the calculation method to **GPA** or **GPA & ISO**, you can also set the following options:
   - GPA Calculator Units (U.S. or S.I.)
   - GPA Pressure Display (PSI, Bar or kPa)
5. If you set the calculation method to **ISO** or **GPA & ISO**, you can also set the following options:
   - ISO Pressure Display (Bar or kPa)
   - Primary Temperatures
     - 0C/0C
     - 0C/15C
     - 0C/20C
     - 15C/0C
     - 15C/15C
     - 15C/20C
     - 20C/0C
     - 20C/15C
     - 20C/20C
     - 25C/0C
     - 25C/15C
     - 25C/20C

Note
Updating this field also updates the primary values—*Sum Factor Pri*, *CV Superior Pri* and *CV Inferior Pri*—that display in the CDT.

   - Secondary Temperatures (same options as Primary Temperatures)

Note
Updating this field also updates the secondary values—*Sum Factor Sec*, *CV Superior Sec* and *CV Inferior Sec*—that display in the CDT.

- Primary CV Units
  - kilojoules per cubic meter (kJ/m3)
  - kilocalories per cubic meter (kCal/m3)
  - kilowatt hours per cubic meter (kWhrs/m3)
  - megajoule per cubic meter (MJ/m3)
  - megajoule per kilogram (MJ/kg)
  - megajoule per mole (MJ/mole)
- Secondary CV Units (same options as Primary CV Units)

6. Click **Save** to accept the changes without closing the window, or click **OK** to accept the change and close the window.

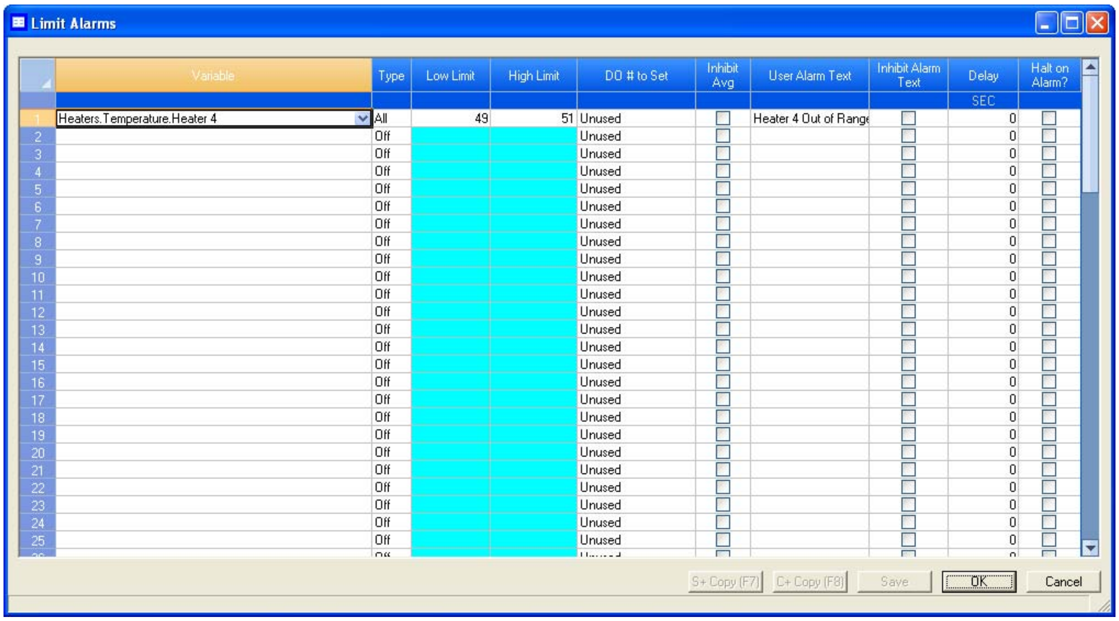
4.8 Setting alarm limits

Use this function to set threshold limits for GC analysis data. When a limit is exceeded, an alarm is activated and logged. See “Viewing the alarm log” on page 5-4 for information on Alarm Logs.

To set an alarm limit for a variable, do the following:

1. Select **Applications** → **Limit Alarms...**. The *Limit Alarms* window displays.

Figure 4-61. The Limit Alarms window



2. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see “Using the context-sensitive variable selector” on page 1-42.

3. To change the alarm type, click the appropriate cell under the *Type* column. You have the following the options:

   - **Off** - Turns off the alarm.
   - **All** - Use high and low limits to activate alarms. Enter the lower limit value in the appropriate cell under the *Low Limit* column. Enter the upper limit value in the appropriate cell under the *High Limit* column.
   - **High** - If the status value of the variable rises above the value set in the corresponding *High Limit* column, the high limit alarm is activated.
   - **Low** - If the status value of the variable falls below the value set in the corresponding *Low Limit* column, the low limit alarm is activated.

4. If you want a discrete output to activate when the alarm triggers, click on the appropriate cell under the *DO # to Set* column and select it from the drop-down list.

5. To prevent or allow averaging when the alarm triggers, double-click on the appropriate cell under the *Inhibit Avg* column, and select one of the following options:

   - **True** - Inhibits averaging when the alarm is active.
   - **False** - Allows averaging when the alarm is active.

6. To customize the text of the alarm message, enter the new text in the appropriate cell under the *User Alarm Text* column. When the alarm triggers, this text will display under the *Alarm Message* column on the *Unack/Active Alarms* window.

Note
If an alarm message is changed, all affected alarm entries, including those previously recorded, will include that change.

7. To enable or disable the use of the customized alarm text, select **True** or **False** from the appropriate cell under the *Inhibit Alarm Text* column.

8. To copy the stream settings from a highlighted row and apply them to the next row, click **S + Copy**. The stream will be copied and incremented to the next available stream--for example, from Stream 2 to Stream 3.

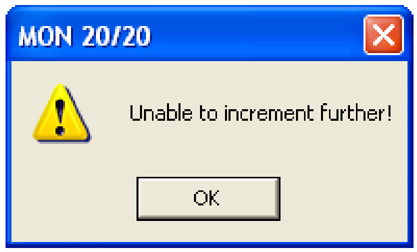
   If there are no streams available, instead of copying the stream, MON 20/20 will display the following message:

Figure 4-62. No streams available warning

9. Click **C + Copy**. The component will be copied and incremented to the next available component--for example, from Ammonia to Benzene.

   If there are no more components available, instead of copying the component, MON 20/20 will display the following message:

Figure 4-63. No components available warning



10. If you want the GC to halt after the current analysis when an alarm is triggered, do the following:

    (a.) Select the **Halt on Alarm?** checkbox.

    (b.) Enter a value in the *Delay* column for the length of time, in seconds, that the alarm condition should exist before the Halt command is executed. You can enter a value between **0** and **1800**.

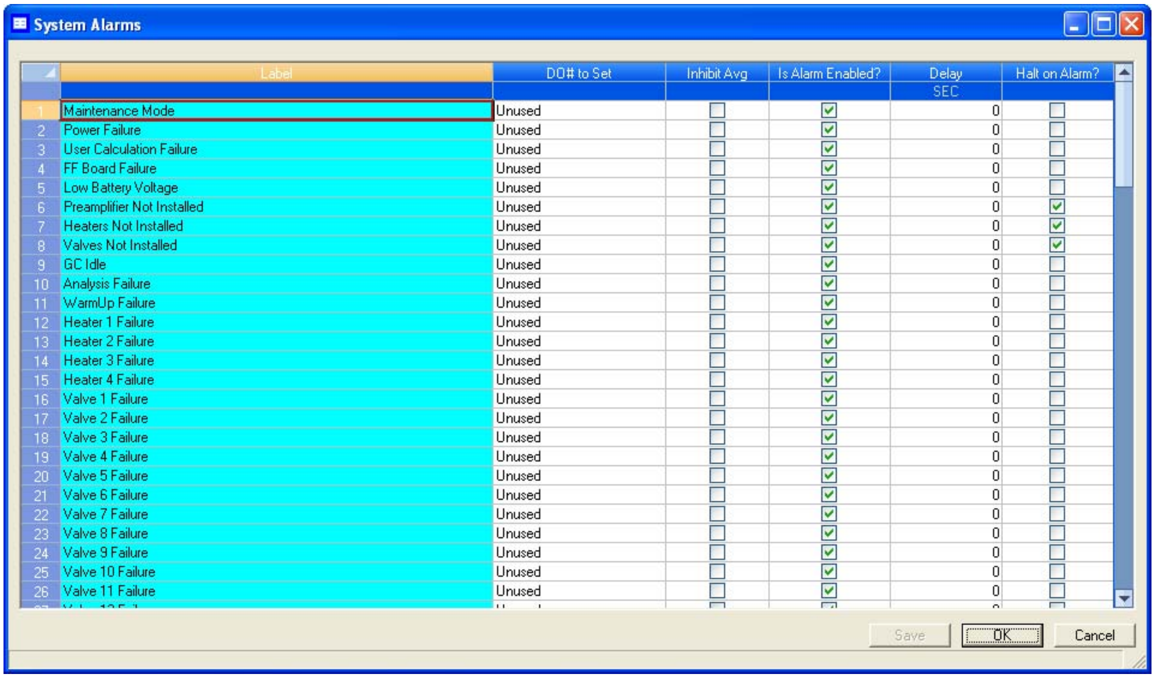
11. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.9 Managing system alarms

To edit system alarms, do the following:

1. Select **System Alarms...** from the **Applications** menu. The *System Limit Alarms* window displays.

Figure 4-64. The Limit Alarms window



2. If you want a discrete output to activate when the alarm triggers, click on the appropriate cell under the *DO # to Set* column and select it from the drop-down list.

3. To prevent or allow averaging when the alarm triggers, double-click on the appropriate cell under the *Inhibit Avg* column, and select one of the following options:
   - **True** - Inhibits averaging when the alarm is active.
   - **False** - Allows averaging when the alarm is active.

4. To enable the alarm check the checkbox under the *Is Alarm Enabled?* column; to disable the alarm, uncheck the checkbox under the *Is Alarm Enabled?* column; to disable the alarm.

5. If you want the GC to halt after the current analysis when an alarm is triggered, do the following:

   (a.) Select the **Halt on Alarm?** checkbox.

   (b.) Enter a value in the *Delay* column for the length of time, in seconds, that the alarm condition should exist before the Halt command is executed. You can enter a value between **0** and **1800**.

6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.10 Managing streams

This function allows you to do the following:

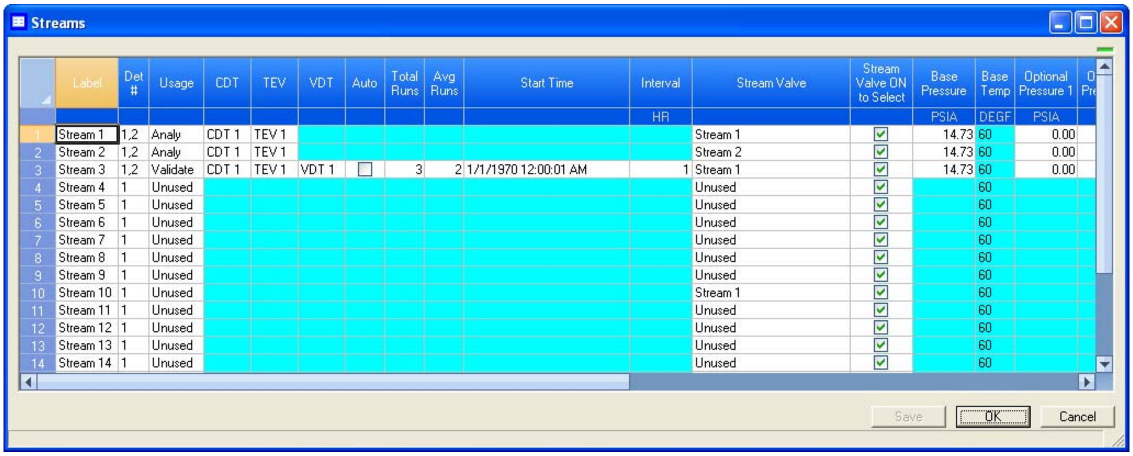
- Assign component data tables, validation data tables, and timed events tables to a particular stream.
- Designate a stream for analysis, validation, or calibration.
- Control automatic calibration or validation parameters, such as the total number of runs, runs to be averaged, starting times, and time between automatic calibrations and baseline runs.
- Define baseline pressure and temperature conditions that are applicable to calculated GC analysis data, such as compressibility.

4.10.1 Designating how a stream will be used

To assign how a stream will be used, do the following:

1. Select **Streams...** from the **Application** menu. The *Streams* window opens.

Figure 4-65. The Streams window



2. For the appropriate stream, select one of the following options from the *Usage* column:
   - **Unused** - Not used
   - **Cal** - Calibration
   - **Analy** - Analysis
   - **Validate** - Validation
3. If you select **Cal** or **Validation**, you can also edit the following parameters:
   - **Auto** - If checked, the calibration or validation will be automatic.
   - **Tot Runs** - The number of runs, from **1** to **10**, to make for each calibration.
   - **Avg Runs** - The number of most-recent calibration runs to average; for instance, if five calibration runs are performed and **Avg Run** is set to 3, then the last three runs of the five will be used to average the calibration results.
   - **Start Time** - The time the first automatic calibration should be performed.
   - **Interval** - The number of hours between automatic calibrations.
   - **Auto Calib** - Enable or disable the automatic calibration run.

- **Auto Baseline** - Enable or disable the automatic baseline run. The GC performs an additional calibration run (before the calibration runs to be averaged) without the calibration gas. This run evaluates the peaks caused by the GC valve action alone; any peak areas found are subtracted from the subsequent analyses.

Note
Disabling the Auto Baseline setting will delete existing CDT baseline data for the associated stream.

---

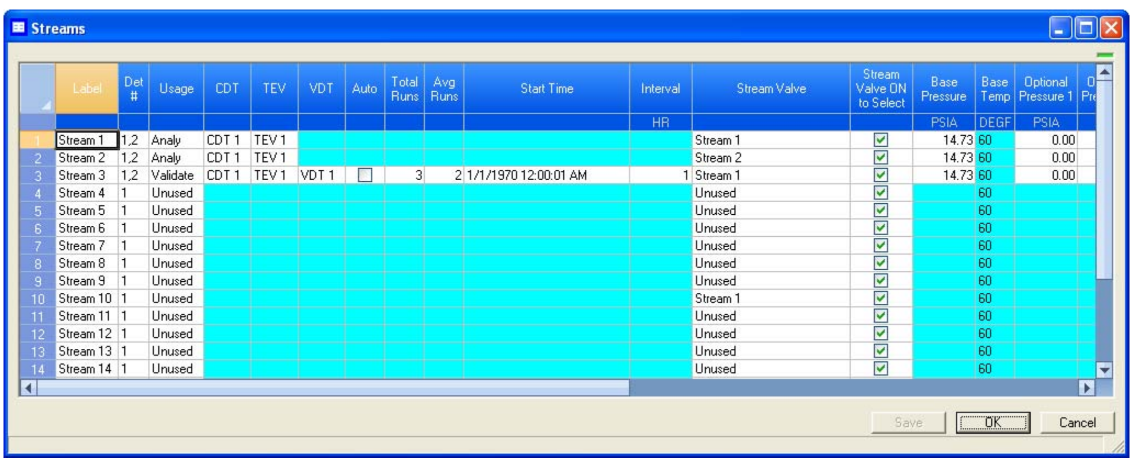
4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.10.2 Assigning a valve to a stream and setting the relationship between the stream's open state to the valve's On/Off state

To assign a valve to a stream, do the following:

1. Select **Streams...** from the **Application** menu. The *Streams* window opens.

Figure 4-66. The Streams window



2. Go to the Stream Valve column for the corresponding stream and select the appropriate valve from the drop-down list.

Details about the valves in the drop-down list can be viewed from the *Valves* window.

3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

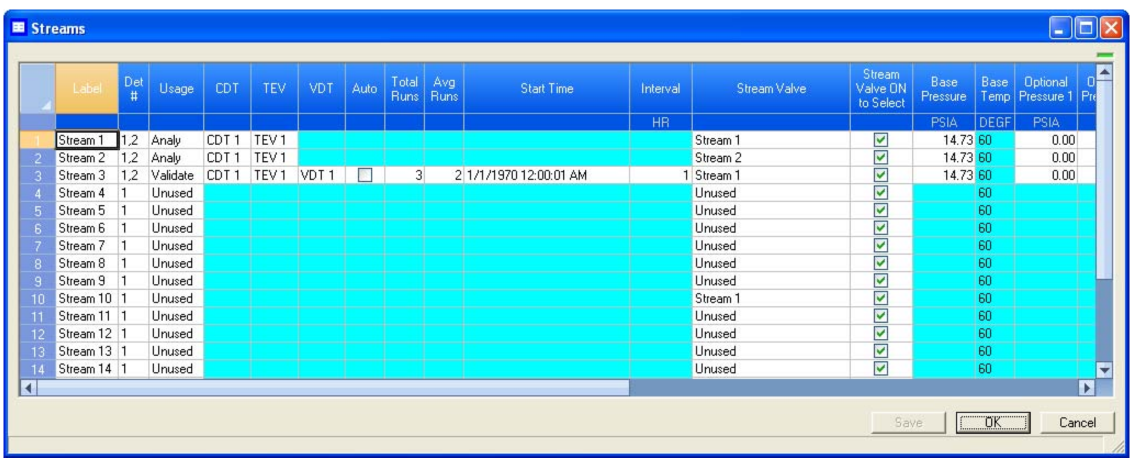
4. To have the stream open when the valve is ON, select the corresponding *Stream Valve On to Select* checkbox; to have the stream open when the valve is OFF, clear the corresponding *Stream Valve On to Select* checkbox.

4.10.3 Assigning a data table to a particular stream

To assign a component data table, a validation data table, or a timed events table to a stream, do the following:

1. Select **Streams...** from the **Application** menu. The *Streams* window opens.

Figure 4-67. The Streams window



2. For the appropriate stream, if *Usage* is set to **Cal** or **Analy**, select a component data table from the *CDT* column and a timed events table from the *TEV* column.

3. For the appropriate stream, if *Usage* is set to **Validate**, select a component data table from the *CDT* column, a timed events table from the *TEV* column, and a validation data table from the *VDT* column.

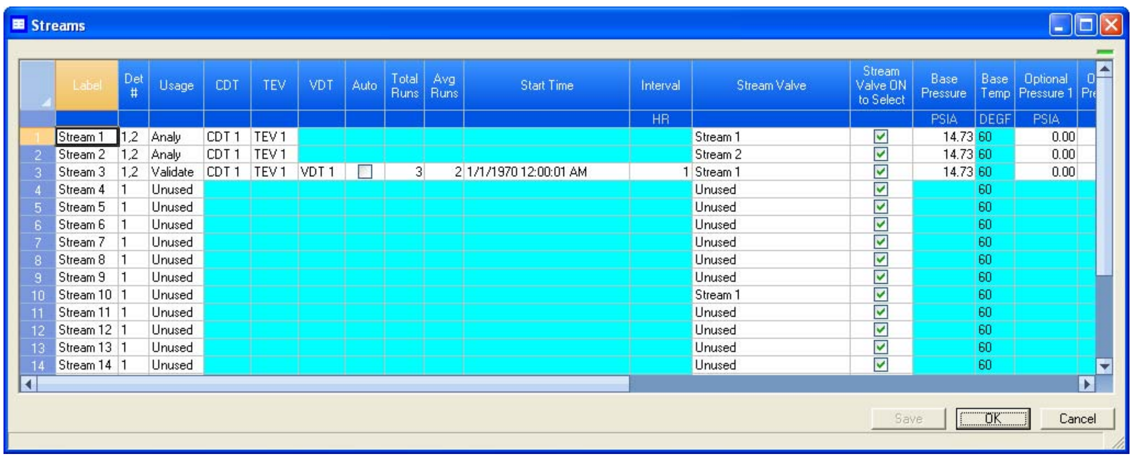
4. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.10.4 Changing the base pressure for a stream

To change the base pressure for a stream, do the following:

1. Select **Streams...** from the **Application** menu. The *Streams* window opens.

Figure 4-68. The Streams window



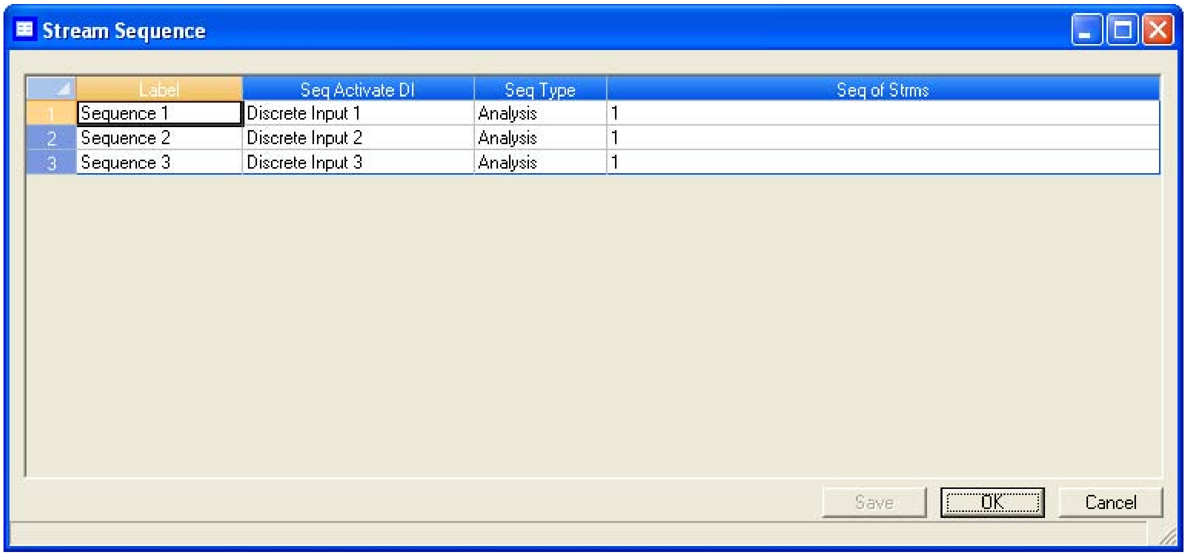
2. For the appropriate stream, double-click on the corresponding cell under the *Base Pressure* column and enter an new value.
3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.11 Creating a stream sequence for a detector

A stream sequence defines the order of stream analysis for a detector. To create or edit a stream sequence, do the following:

1. Select **Stream Sequence...** from the **Application** menu. The *Stream Sequence* window displays.

Figure 4-69. The Stream Sequence window



2. Each stream sequence table can contain up to three sequences--a primary, or default, sequence, and two auxiliary sequences. The table for detector that is designated as “1” displays by default. To display a different table, select it from the *Choose table:* drop-down list.
3. To create a new stream sequence, click **Insert before**.

Note
There can only be three sequences per detector. If a detector already has three sequences and you want to create a new one, you must edit or delete one of the existing sequences. Click Delete to delete a sequence.

4. Double-click the appropriate cell under the *Strm Seq Name* column to give your new sequence a name, or to edit the name of an existing sequence. Type in the new name.
5. To define the order of analysis, double-click the appropriate cell under the *Seq of Strms* column and the numbers for the streams, seperated by commas, that should be analyzed.
6. To define which discrete input should activate the sequence, select it from the drop-down list of the appropriate cell under the *Seq Activate DI* column.

Note
No two sequences can be activated by the same discrete input.

7. Select the type of analysis the detector should perform when following the sequence. There are two options:
   - **Analysis** - The detector performs a real analysis of the streams.
   - **Validation** - The detector performs a test analysis to verify that it is working properly.
8. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.12 Communications

Use this function to configure and manipulate the communication settings the GC uses to connect with a Data Collection System (DCS).

To add a new communications port setting to the *Communication* window, click **Insert before**. A new row will be added to the *Communication* table.

The following table lists the parameters that can be edited for the communications port setting:

Name	Description
Label	The name of the group of settings.
ModBus Id	Identification number of the ModBus device.
Baud Rate	The baud rate setting. Options are: **1200**, **2400**, **9600**, **19200**, **38400**, and **57600**. For high performing PCs, set the baud rate to **38400**. If you experience a communications failure at this rate, set the baud rate to **9600**. Baud rate settings less than 9600 may result in real-time delivery that is unacceptably slow.
Data Bits	The number of data bits. Options are **7** and **8** (default).
Stop Bit	The number of stop bits. Options are **1** (default) and **2**.
Parity	The parity check method. Options are **None** (default), **Even** and **Odd**.
HW Flow Cntrl	Allows you to enable or disable hardware handshaking signals (RTS/CTS).

RTS Off Dly	The delay in milliseconds between RTS termination and the end of data transmission. Range: **0** to **1000**
RTS ON Sly	The delay in milliseconds between RTS activation and the start of data transmission Range: **0** to **1000**
Port Resp Dly	The delay in milliseconds the communication port will wait before sending a response back to device. Range: **0** to **100**
Port Avail	Allows you to enable or disable the communication port.
Timeout	The time interval in seconds within which the GC is required to read the response from device.
Unit System	Sets the type of measurement system to use. Options are **U.S. Customary** or **Metric**.
MAP File	Points to the file that contains the registers that should be used.
Port	Allows you to set the type of protocol to be used for the port: **RS232**, **RS422** or **RS485**. If the port is set to RS422 or RS485, additional configuration steps are required; see your GC manual for more information

To delete a communications port setting from the *Communication* window, click **Delete**. A selected row will be deleted from the *Communication* table.

4.12.1 Creating or editing registers

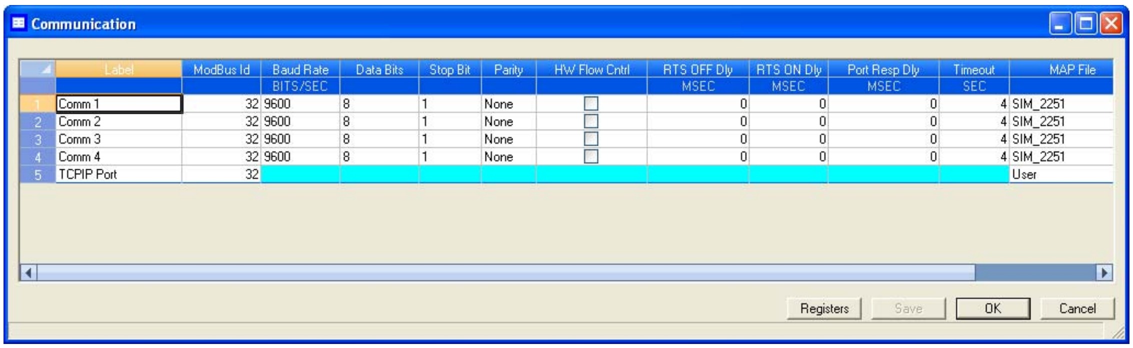
You can map GC data to Modbus registers and generate MAP files, which can then be associated with communications ports.

For a list of variable assignments made to all registers, consult the Communication section of the PC Config Report.

To map GC data to Modbus registers, do the following:

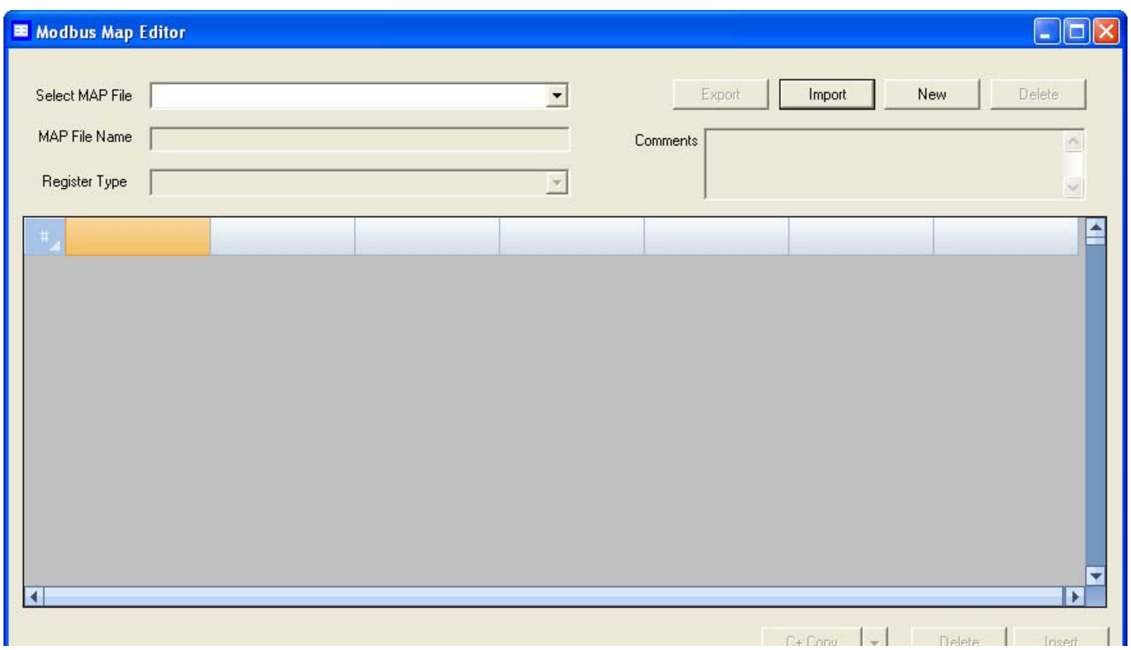
1. Select **Communication...** from the **Application** menu. The *Communication* window appears.

Figure 4-70. The Communication window



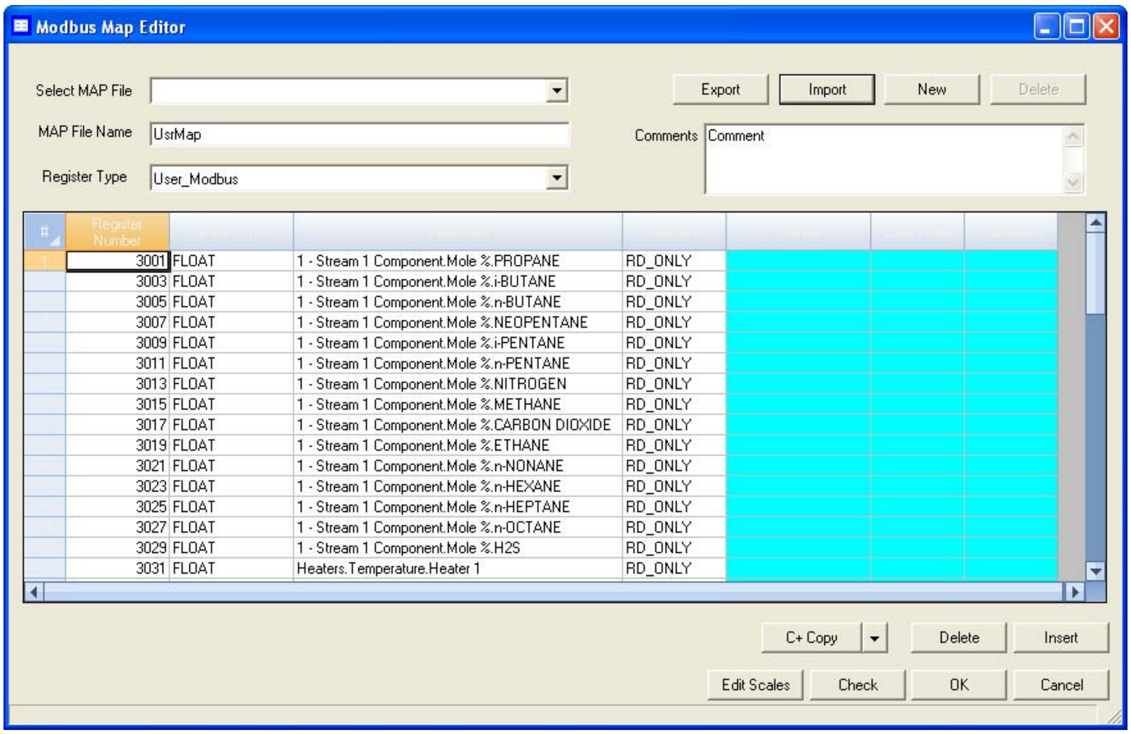
2. Click **Registers**. The *Modbus Map Editor* window appears.

Figure 4-71. The Modbus Map Editor window



3. To view or edit registers that are contained in an existing MAP file, click on the *Select MAP File* drop-down list and select the appropriate file. The registers will load into the table.

Figure 4-72. The Modbus Map Editor window



4. To edit a cell, double-click it. You can edit the following parameters:

Name	Description
Register Number	Displays the number for the Modbus register that will be polled by a connected data acquisition system.
Data Type	Describes the type of data that is stored in the register. SIM_2251 and User_Modbus options are: • BOOLEAN • INT • LONG • FLOAT • Bitmap(INT) • Bitmap(LONG) • SCALED_FP1 ... • SCALED_FP32 If one of the scaled floating point options is chosen, the **Zero Scale** and **Full Scale** values for that option will display in the appropriate column cells. The default User_Modbus data type is **FLOAT**, which means the value is not converted to an integer and is stored in two adjacent registers. Data types other than FLOAT require only one register per variable.
Variable(s)	Displays the variable(s) whose value is to be stored in the register. To change the variable, see "Assigning a variable to a register" on page 4-92.
Access	Determines whether the register will be read-only (**RD_ONLY**) or read/write (**RD_WR**).

5. To copy the component settings from a highlighted row and apply them to the next row, click **C + Copy**. This feature also increments the Component value to the next available component (e.g., incrementing from Ammonia to Benzene), per the GC application. An error message displays when the last available component is reached.
6. To copy the stream settings from a highlighted row and apply them to the next row, click **S + Copy**. This feature also increments the Stream value to the next available stream (e.g., incrementing from Stream 2 to Stream 3), per the GC application. An error message displays when the last available stream is reached.
7. To delete a row, click **Delete**.
8. To insert a row, click **Insert**.

9. To check for conflicting register assignments, click **Check**. MON 20/20 will check the table and if it encounters a conflict it will display the following message:

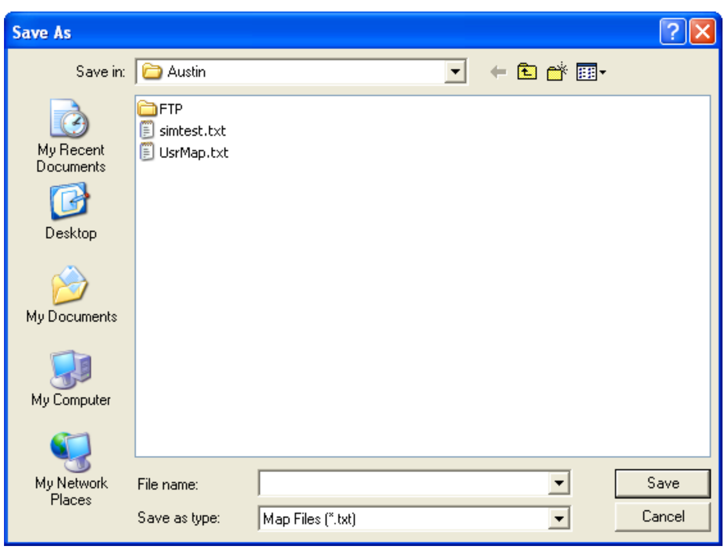
Figure 4-73. Conflicting registers warning

Review the table to locate the conflicting registers and change one.

10. To save the MAP file, do the following:

(a.) Click **Export**. MON 20/20 validates the table for errors--for instance, ensuring that no two registers share a register number. If any errors are found MON 20/20 displays the appropriate error message. When no errors are found, the *Save As* window displays.

Figure 4-74. The Save As window



(b.) Enter a new name for the file or select the file that you want to overwrite.

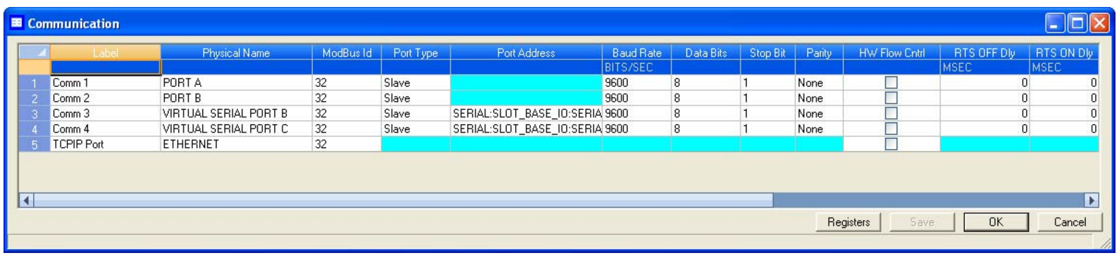
(c.) Click **Save**.

4.12.2 Creating a new map file

To create a new MAP file, do the following:

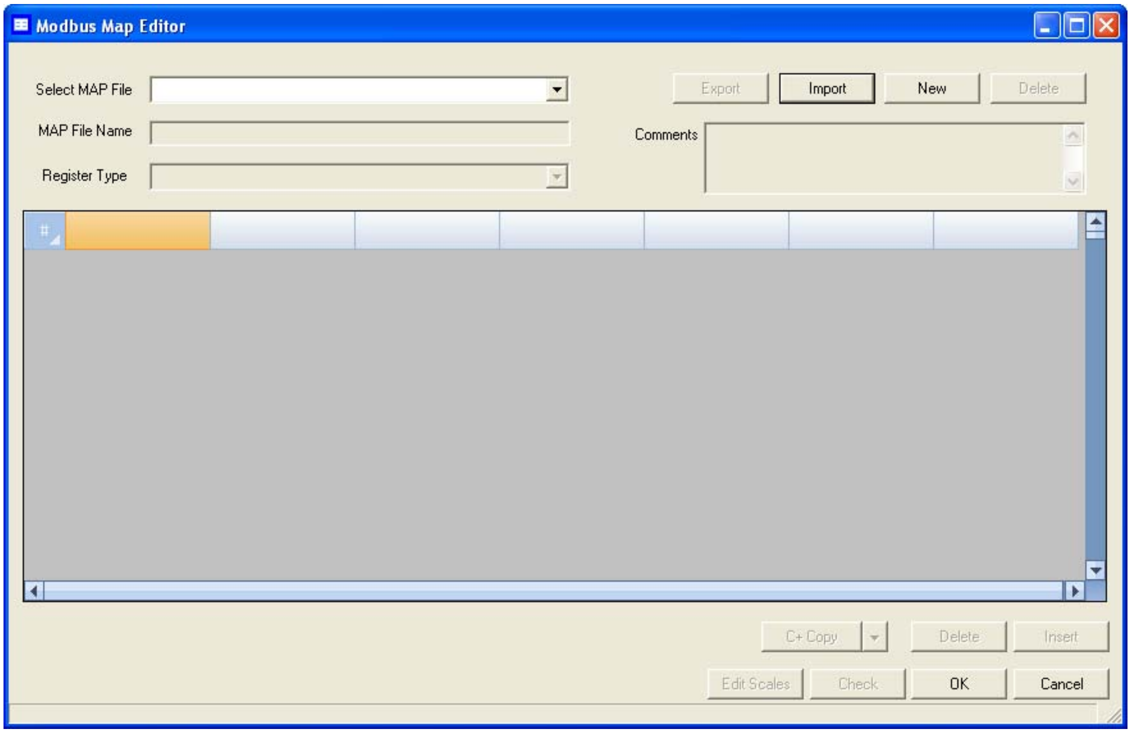
1. Select **Communication...** from the **Application** menu. The *Communication* window appears.

Figure 4-75. The Communication window



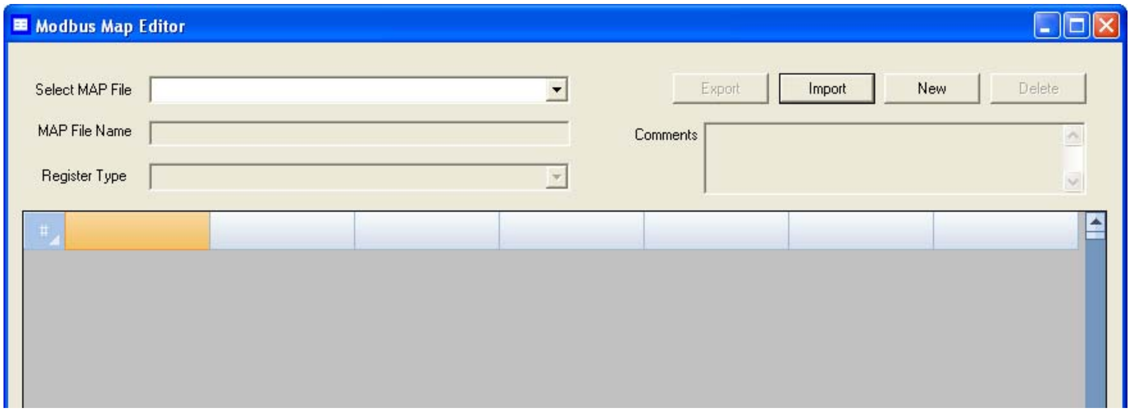
2. Click **Registers**. The *Modbus Map Editor* window appears.

Figure 4-76. The Modbus Map Editor window



3. Click **New**. A new row will be added to the table and the column headings will be empty.

Figure 4-77. The Modbus Map Editor window



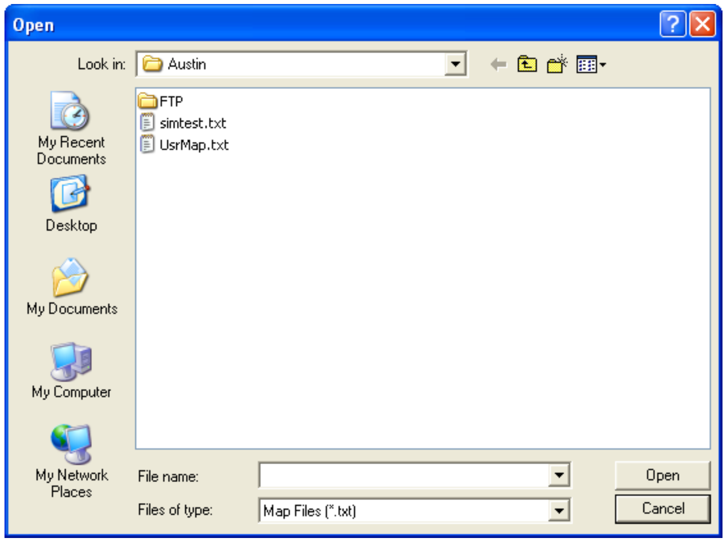
4. From the *Register Type* drop-down list, select the type of PLC emulation protocol you want to use. You have two options: **User_Modbus**, which is a PLC emulation Modbus protocol that can use scaling to convert floating point numbers to integers, and **SIM_2251**, which emulates the Daniel 2500 communication protocol and is a simulation of the 2251 GC controller.

   The table's column headers change based on which protocol is selected.

5. If you want to base the new MAP file on an existing MAP file, do the following:

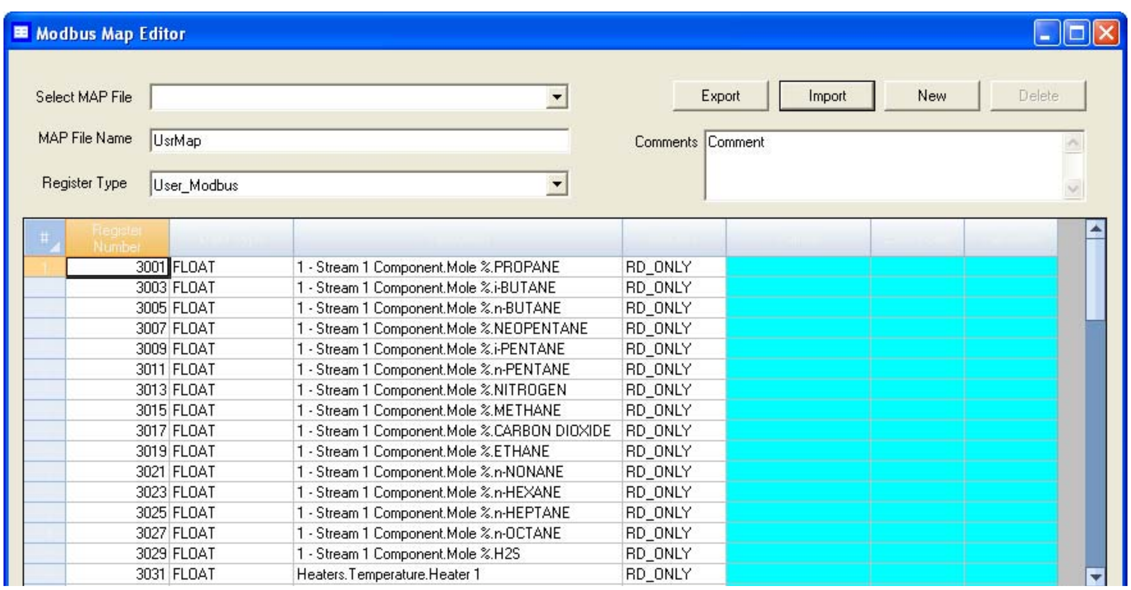
   (a.) Click **Import**. The *Open* window displays.

Figure 4-78. The Open window



(b.) Select the file that you want to import and click **Open**. The registers from the selected file will load into the table.

Figure 4-79. The Modbus Map Editor



6. To edit a cell, double-click it. You can edit the following parameters:

Name	Description
Register Number	Displays the number for the Modbus register that will be polled by a connected data acquisition system.
Data Type	Describes the type of data that is stored in the register. SIM_2251 registers use only one data type: **FLOAT**. User_Modbus options are: • BOOLEAN • INT • LONG • FLOAT • Bitmap(INT) • Bitmap(LONG) • SCALED_FP1 ... • SCALED_FP32 If one of the scaled floating point options is chosen, the **Zero Scale** and **Full Scale** values for that option will display in the appropriate column cells. The default User_Modbus data type is **FLOAT**, which means the value is not converted to an integer and is stored in two adjacent registers. Data types other than FLOAT require only one register per variable.
Variable(s)	Displays the variable(s) whose value is to be stored in the register. To change the variable, see "Assigning a variable to a register" on page 92.
Access	Determines whether the register will be read-only (**RD_ONLY**) or read/write (**RD_WR**).

7. To copy the component settings from a highlighted row and apply them to the next row, click **C + Copy**. This feature also increments the Component value to the next available component (e.g., incrementing from Ammonia to Benzene), per the GC application. An error message displays when the last available component is reached.
8. To copy the stream settings from a highlighted row and apply them to the next row, click **S + Copy**. This feature also increments the Stream value to the next available stream (e.g., incrementing from Stream 2 to Stream 3), per the GC application. An error message displays when the last available stream is reached.
9. To delete a row, click **Delete**.
10. To insert a row, click **Insert**.

11. To check for conflicting register assignments, click **Check**. MON 20/20 will check the table and if it encounters a conflict it will display the following message:

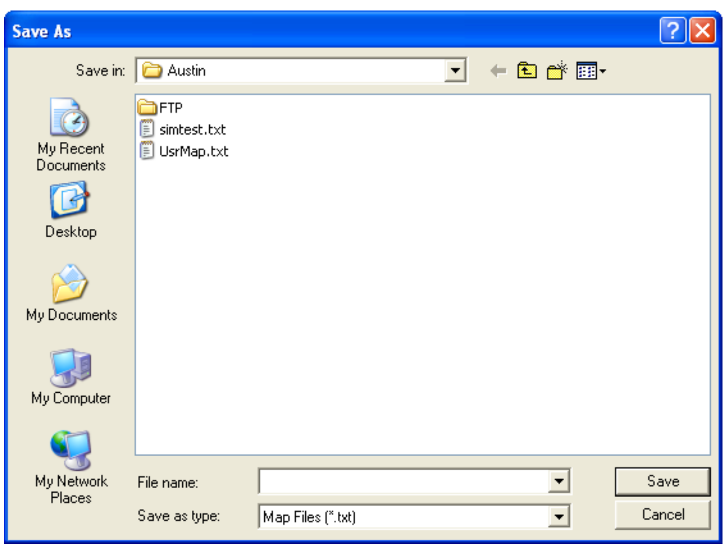
Figure 4-80. Conflicting registers warning

Review the table to locate the conflicting registers and change one.

12. To save the MAP file, do the following:

(a.) Click **Export**. MON 20/20 validates the table for errors--for instance, ensuring that no two registers share a register number. If any errors are found MON 20/20 displays the appropriate error message. When no errors are found, the *Save As* window displays.

Figure 4-81. The Save As window



(b.) Enter a new name for the file or select the file that you want to overwirte.

(c.) Click **Save**.

4.12.3 Assigning a variable to a register

To assign a variable to a register, from the *Modbus Map Editor* window, double-click the appropriate *Variable(s)* cell and select a new variable.

For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

4.12.4 Viewing or editing scales

Scales allow you to use one register to store floating point variables instead of the customary two registers. By using a scale, floating point data can then be converted to integer values.

MON 20/20 supports 32 different scales that are labelled **SCALED_FP1** through **SCALED_FP32**. The *Data Type* column on the *Modbus Map Editor* window displays the type of scale, if any, that is being used for a particular register. If a scale is being used, the *Zero Scale* and *Full Scale* columns will display the lower and upper values for the chosen scale.

To view the list of scales, select **Application** → **Communication...** → **Registers** and click **Edit Scales** from the *Modbus Map Editor* window. The *Edit Scales* window displays all of the scales, along with each scales lower and upper values.

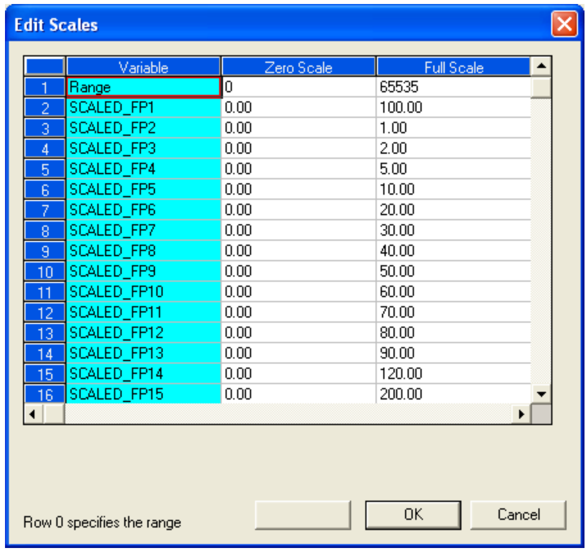


Figure 4-82. The Edit Scales window

Use the following formula to calculate the variable's integer value:

$$integer = \left(\frac{R_F - R_Z}{S_F - S_Z}\right)(D_{fp} - S_Z) + R_Z$$

where:

R_F = Full Scale, range

R_Z = Zero Scale, range

S_F = Full Scale, scale

S_Z = Zero Scale, scale

D_{fp} = Floating Point value

For example:

$R_F = 65535$

$R_Z = 0$

$S_F = 100$ (from SCALED_FP1)

$S_Z = 0$ (from SCALED_FP1)

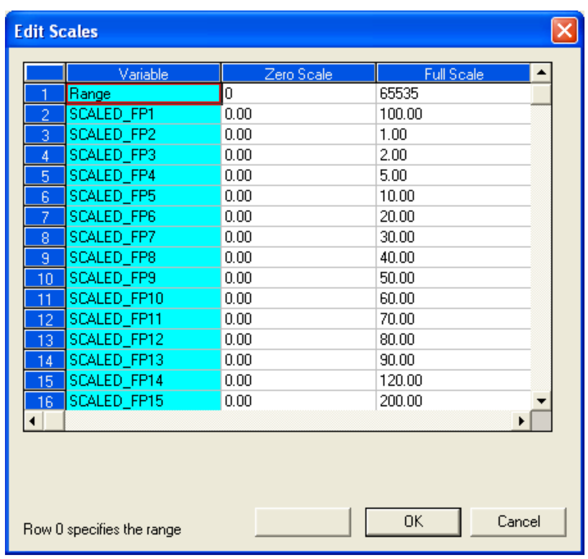
$D_{fp} = 97.13$ (scaled percent for methane)

$$63654 = \left(\frac{65535 - 0}{100 - 0}\right)(97.13 - 0) + 0$$

To edit or create your own scale, do the following:

1. Select **Application** → **Communication...** → **Registers** and click **Edit Scales** from the *Modbus Map Editor* window.

Figure 4-83. The Edit Scales window



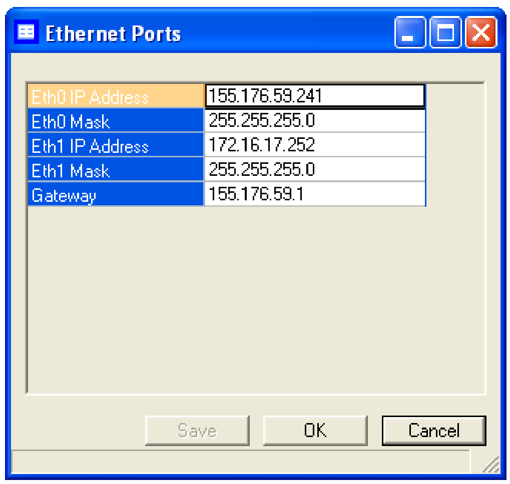
2. Double-click on the appropriate cell and enter a new value.
3. To save the changes and close the window, click **OK**.

4.13 Configuring the gas chromatograph's Ethernet port

The 700XA has two ethernet ports that can be used to connect the GC with MON 20/20.

To configure one or both ethernet ports, select **Ethernet Ports...** from the **Application** menu. The **Ethernet Ports** window displays.

Figure 4-84. The Ethernet Ports window



The following table describes the ethernet ports' parameters:

Eth0 IP Address	IP address to use to connect to the GC at port Eth0.
Eth0 Mask	Subnet mask for the IP address at port Eth0.
Eth1 IP Address	IP address to use to connect to the GC at port Eth1.
Eth1 Mask	Subnet mask for the IP address at port Eth1.
Gateway	Default gateway address for the network.

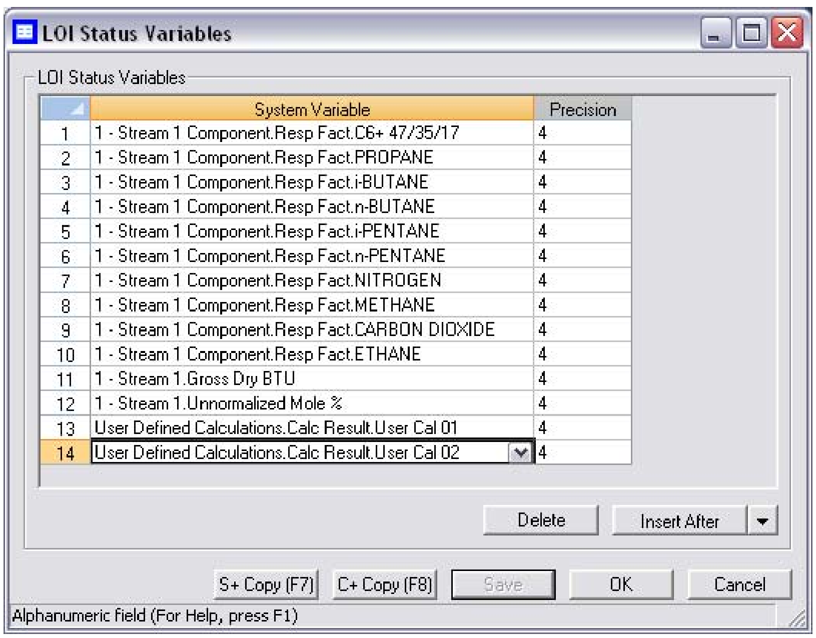
4.14 Working with local operator interface variables

Use this window to select and configure up to 25 GC parameters that you would like to monitor using the LOI's *Display* mode. Refer to the *700XA Gas Chromatograph System Reference Manual* (P/N# 3-9000-744) for more information about the LOI.

To set an LOI parameter, do the following:

1. Select **LOI Status Variables...** from the **Application** menu. The *LOI Status Variables* window appears.

Figure 4-85. The LOI Status Variables window



2. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

Note
If Include Mole Percents for current stream is checked, the maximum number of variables you can select is five; if Include Mole Percents for current stream is not checked, you can choose up to 25 variables.

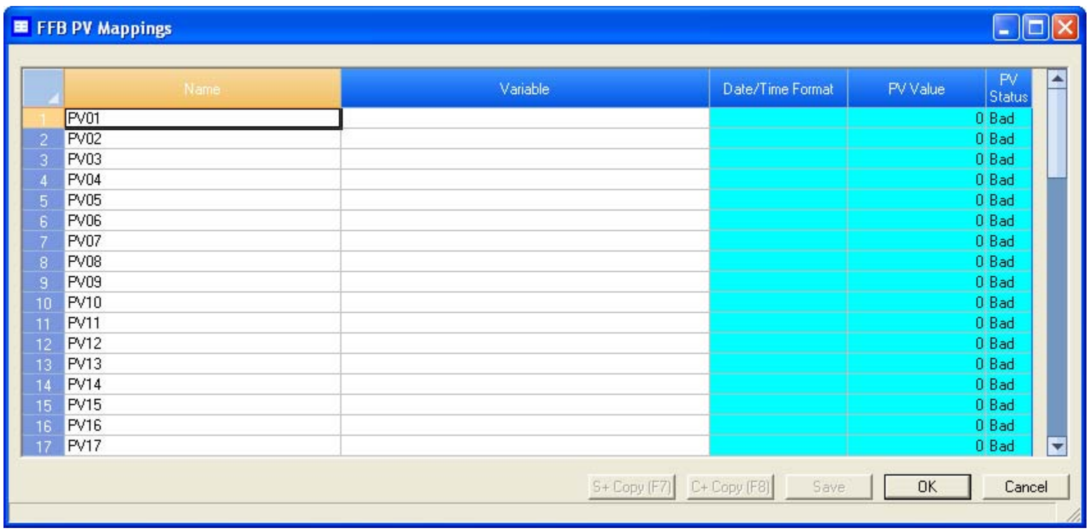
3. To copy the stream settings from a highlighted row and apply them to the next row, click **S + Copy**. This feature also increments the *Stream* value to the next available stream—for instance, incrementing from Stream 2 to Stream 8, per the GC application.
4. To copy the component settings from a highlighted row and apply them to the next row, click **C + Copy**. This feature also increments the *Component* value to the next available component—incrementing from Ammonia to Benzene, per the GC application.
5. Enter a value in the *Precision* column to indicate the number of decimal places to display for this particular variable. For component concentrations, the range of possible Precision values is between **2** and **6**. For all other variables, the range of possible values is between **0** and **6**.
6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

4.15 Mapping Foundation Fieldbus variables

To map a GC variable to a Foundation Fieldbus process variable (PV), do the following:

1. Select **FFB PV Mappings...** from the **Application** menu. The *FFB PV Mappings* window displays.

Figure 4-86. The FFB PV Mappings window



2. Select a new variable by clicking on the appropriate drop-down list under the *Variable* column. For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

Note
The *PV Value* column displays the current value of the GC variable indicated in the Variable column.

Note
The *PV Status* column indicates the state of the data displayed in the *PV Value* column. If the data was generated under predictable conditions, then the status for all mapped process variables will be **Good**; if the data was generated under unpredictable conditions—that is, if any alerts were triggered during the analysis cycle—then the status for all mapped process variables will be **Bad**, because the GC cannot guarantee the results of the analysis.

3. To copy the stream settings from a highlighted row and apply them to the next row, click **S + Copy**. This feature also increments the *Stream* value to the next available stream—for instance, incrementing from Stream 2 to Stream 8, per the GC application.
4. To copy the component settings from a highlighted row and apply them to the next row, click **C + Copy**. This feature also increments the *Component* value to the next available component—incrementing from Ammonia to Benzene, per the GC application.
5. If necessary, enter a date or time format into the *Date/Time Format* column.
6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

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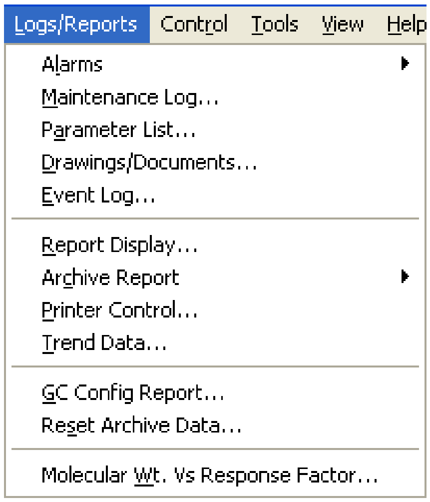
Section 5: Logs and reports



The options in the Logs/Reports menu allow you to do the following:

- Keep a maintenance record.
- Keep a parameter record.
- View alarm, system and event logs.
- View and print trend data.
- View the GC Config report.
- View relevants drawings and diagrams.
- View archived analysis, calibration and averages reports.
- Configure how and when certain reports are printed.

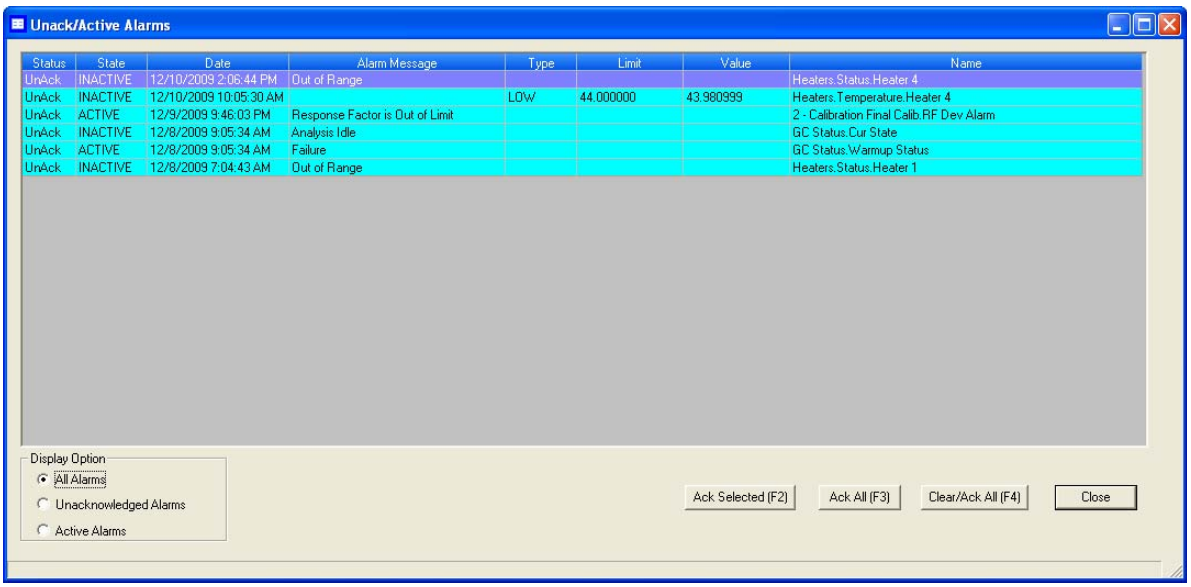
5.1 Viewing and clearing alarms

Use this menu to view and/or clear unacknowledged and active alarms, as well as to view the Alarm Log.

5.1.1 Viewing unacknowledged and active alarms

To view unacknowledged and active alarms, select **Logs/Reports** → **Alarms** → **Unack/Active Alarms....** The *Unack/Active Alarms* window displays.

Figure 5-1. The Unack/Active Alarms window



Note
Double-clicking on the GC Status Bar from the main window also displays the *Unack/Active Alarms* window.

There are three display options for viewing alarms on this window:

- To view both unacknowledged alarms and active alarms, check **All Alarms**.
- To view unacknowledged alarms only, check **Unacknowledged Alarms**.

- To view active alarms only, check **Active Alarms**. This is the default display option.

The *Unack/Active Alarms* window supplies the following data for each alarm:

Name	Description
Status	Indicates whether the alarm has been acknowledged or not.
State	Indicates whether the alarm is **ACTIVE** or **INACTIVE**.
Date	Indicates the date and time at the GC when the alarm condition began.
Alarm Message	Describes the alarm condition.
Type	Indicates whether a high limit or low limit alarm was trigger: • **HI** means a high limit alarm was triggered. • **LO** means a high limit alarm was triggered.
Limit	Indicates the value that was set as the trigger for the alarm.
Value	Indicates the current status value being output by the device.
Name	Indicates the name of the variable that triggered the alarm.

Note
Discrete alarms do not display Type, Limit, or Value data.

5.1.2 Acknowledging and clearing alarms

There are three ways to acknowledge and clear alarms:

- To acknowledge and clear alarms without viewing them, select **Logs/Reports → Alarms → Clear/Ack All Active Alarms**.
- Another method to acknowledge and clear alarms without viewing them is to click  from the Toolbar.
- To view the alarms before acknowledging and clearing them, select **Logs/Reports → Alarms → Unack/Active Alarms...**. The *Unack/Active Alarms* window provides several options:
  - To acknowledge an alarm, select it and then click **Ack Selected (F2)**.

Note
An alarm triggered by a user-defined value will continue to display as an active alarm until that value is no longer in the alarm state.

- To acknowledge all the alarms displayed on the window, click **Ack All (F3)**.
- To acknowledge all the alarms displayed on the window and then remove them from the table, click **Clear/Ack All (F4)**.

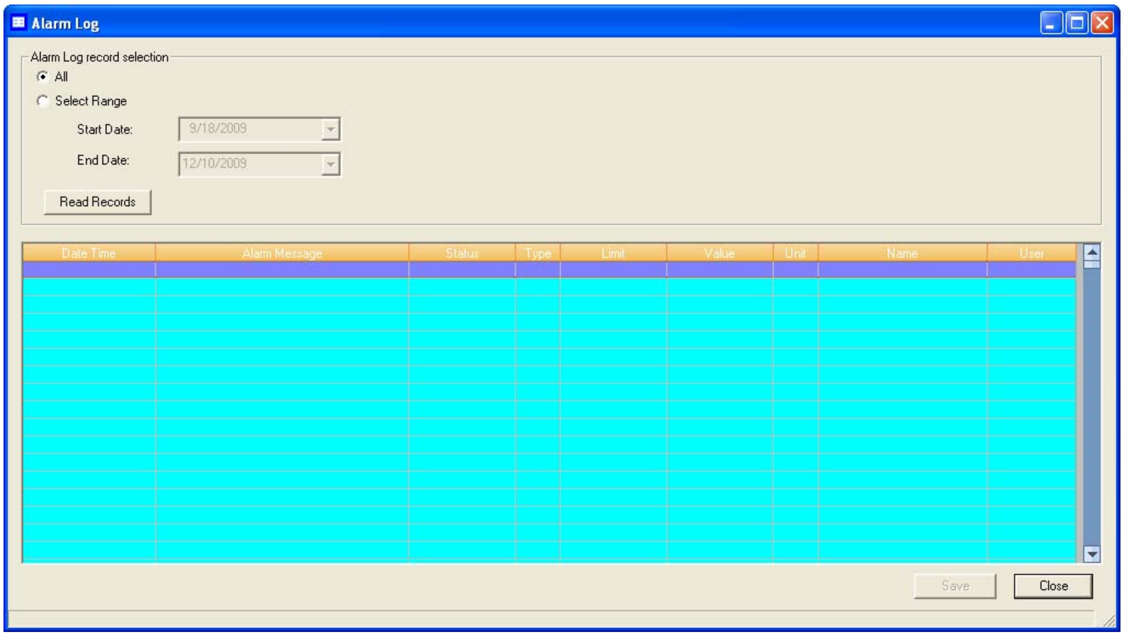
Note
If an alarm is cleared before the condition has been resolved, MON 20/20 redisplays the alarm entry as an active alarm.

5.1.3 Viewing the alarm log

The Alarm Log records every alarm triggered from the GC. The *Alarm Log* window gives you the option of viewing the total list of alarms, or a date-filtered list.

To view the Alarm Log, select **Logs/Reports** → **Alarms** → **Alarm Log...**. The *Alarm Log* window displays.

Figure 5-2. The Alarm Log window



The *Alarm Log* window supplies the following data for each alarm:

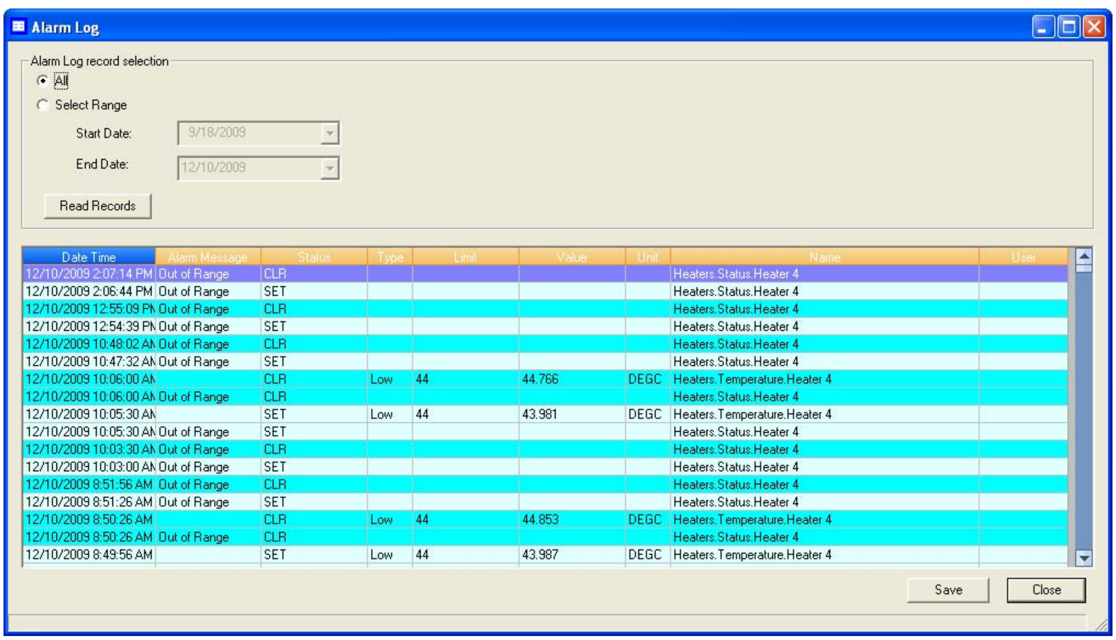
Name	Description
Date	Indicates the date and time at the GC when the alarm condition began.
Alarm Message	Describes the alarm condition.
Status	Indicates whether the alarm is **SET** (active) or **CLR** (inactive).
Type	Indicates whether a high limit or low limit alarm was trigger: • **High** means a high limit alarm was triggered. • **Low** means a high limit alarm was triggered.
Limit	Indicates the value that was set as the trigger for the alarm.
Value	Indicates the current status value being output by the device.
Unit	If applicable, unit of measurement for the displayed values.
Name	Indicates the name of the variable that triggered the alarm.
User	Indicates which user made the change.

Note
Discrete alarms do not display Type, Limit, or Value data.

To view a list of alarms, do the following:

1. To view all alarms, select the *All* checkbox. Otherwise, select the *Select Range* checkbox and use the *Start Date* and *End Date* drop-down boxes to select a date range.
2. Click **Read Records**. The list of alarms display with the most recent alarm at the top and the oldest alarm at the bottom. The alarms are also sorted and color-coded by time so that alarms that occurred simultaneously are grouped together.

Figure 5-3. The Alarm Log window



3. To save the list, click **Save**. The list can be saved in the following formats:
   - Tab-Delimited (.txt)

- Comma-Delimited (.csv)
- Microsoft Excel (.xls)
- HTML File (.html)
- XML File (.xml)

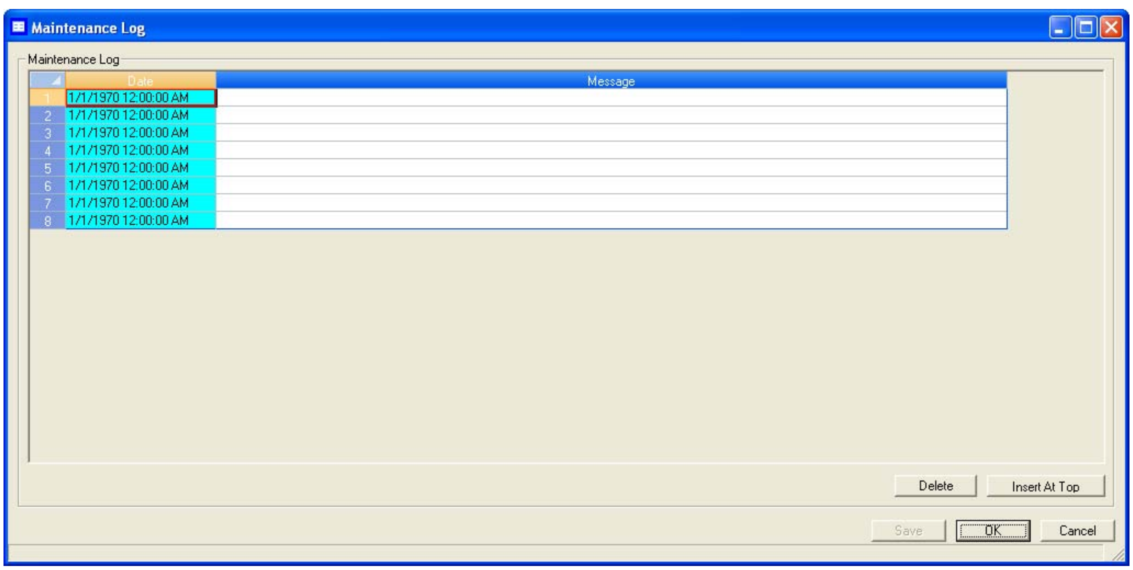
4. To close the window, click **Close**.

5.2 Viewing the maintenance log

Use this function to manually record and track maintenance activities performed on a given GC unit.

To view the maintenance log, select **Maintenance Log...** from the **Log/ Reports** menu.

Figure 5-4. The Maintenance Log window

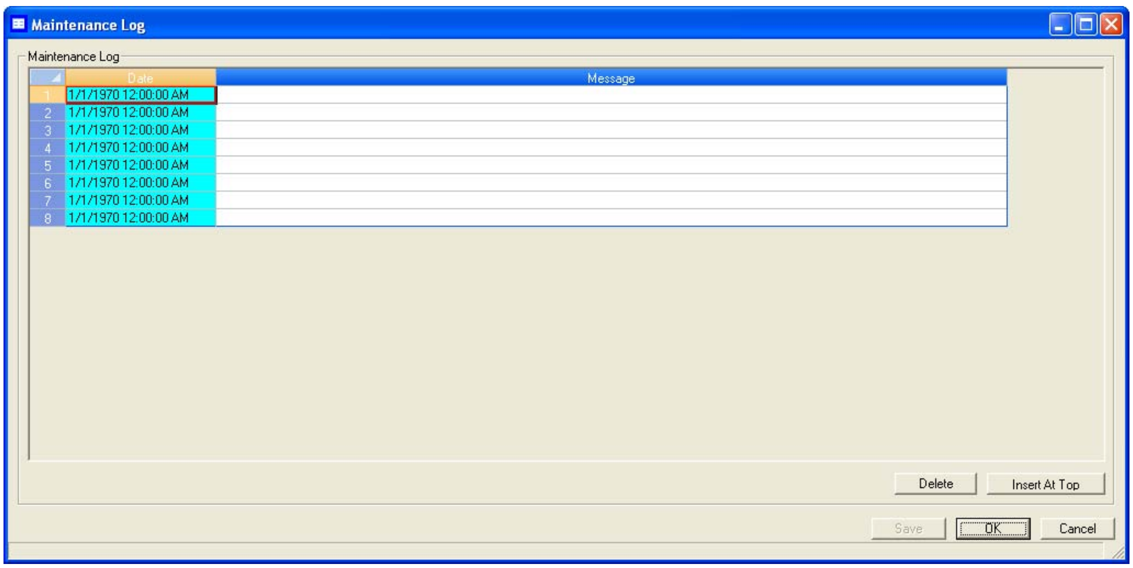


5.2.1 Adding an Entry to the Maintenance Log

To add an entry to the maintenance log, do the following:

1. Select **Maintenance Log...** from the **Log/Reports** menu. The **Maintenance Log** window displays.

Figure 5-5. The Maintenance Log window



2. Click **Insert At Top**. A new row appears on the maintenance log table. The *Date* field contains the GC's current date and time, and is editable.
3. Double-click the *Message* cell and enter the relevant information for the log entry.

Note
NOTE: To edit an old log entry, click on it and the cell will become editable.

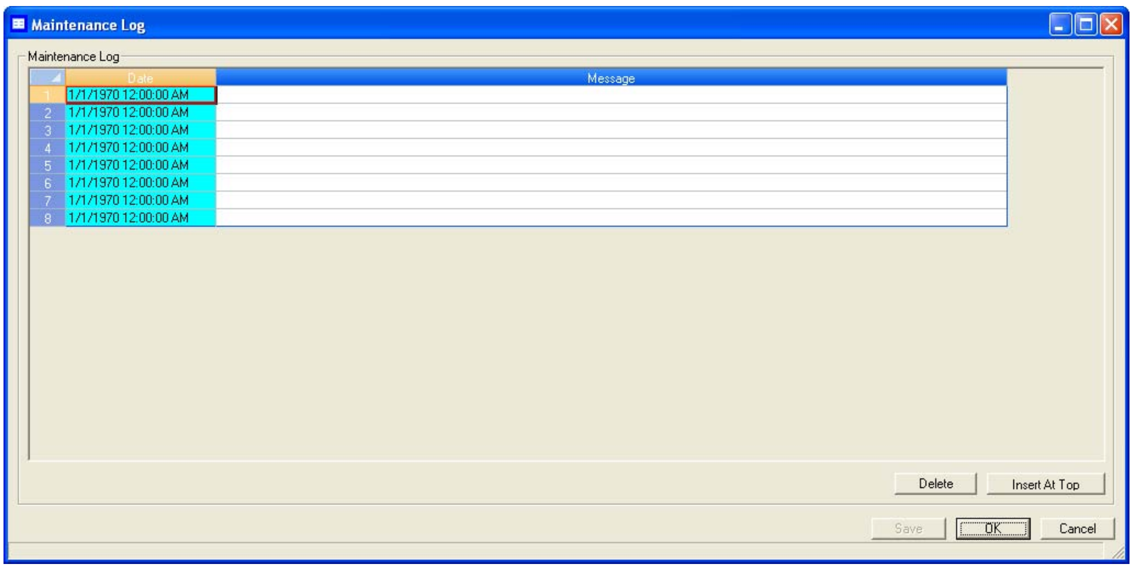
4. To save the changes and keep the window open, click **Save**. To save the changes and close the window, click **OK**.

5.2.2 Deleting an entry from the maintenance log

To delete an entry from the maintenance log, do the following:

1. Select **Maintenance Log...** from the **Log/Reports** menu. The **Maintenance Log** window displays.

Figure 5-6. The Maintenance Log window



2. Select the entry that you want to delete.
3. Click **Delete**. The entry is removed from the maintenance log.
4. To save the changes and keep the window open, click **Save**. To save the changes and close the window, click **OK**.

5.3 Working with the parameter list

Use this feature to keep a record of the hardware components and associated parameters for a given GC.

The Parameter List is a Microsoft Excel document that can be viewed and edited from MON 20/20. Before attempting to edit the document, be sure to review it first to get an idea of what sorts of data it contains.

The Parameter List may contain one or all of the following pages:

- Cover Sheet
- TE Rework
- App Data
- Programming
- Strm Data
- Col Data
- Cal Std Data

5.3.1 Viewing and editing the parameter list

To view and edit the Parameter List, do the following:

1. Select **Parameter List...** from the **Logs/Reports** menu. The *Parameter List* window displays.

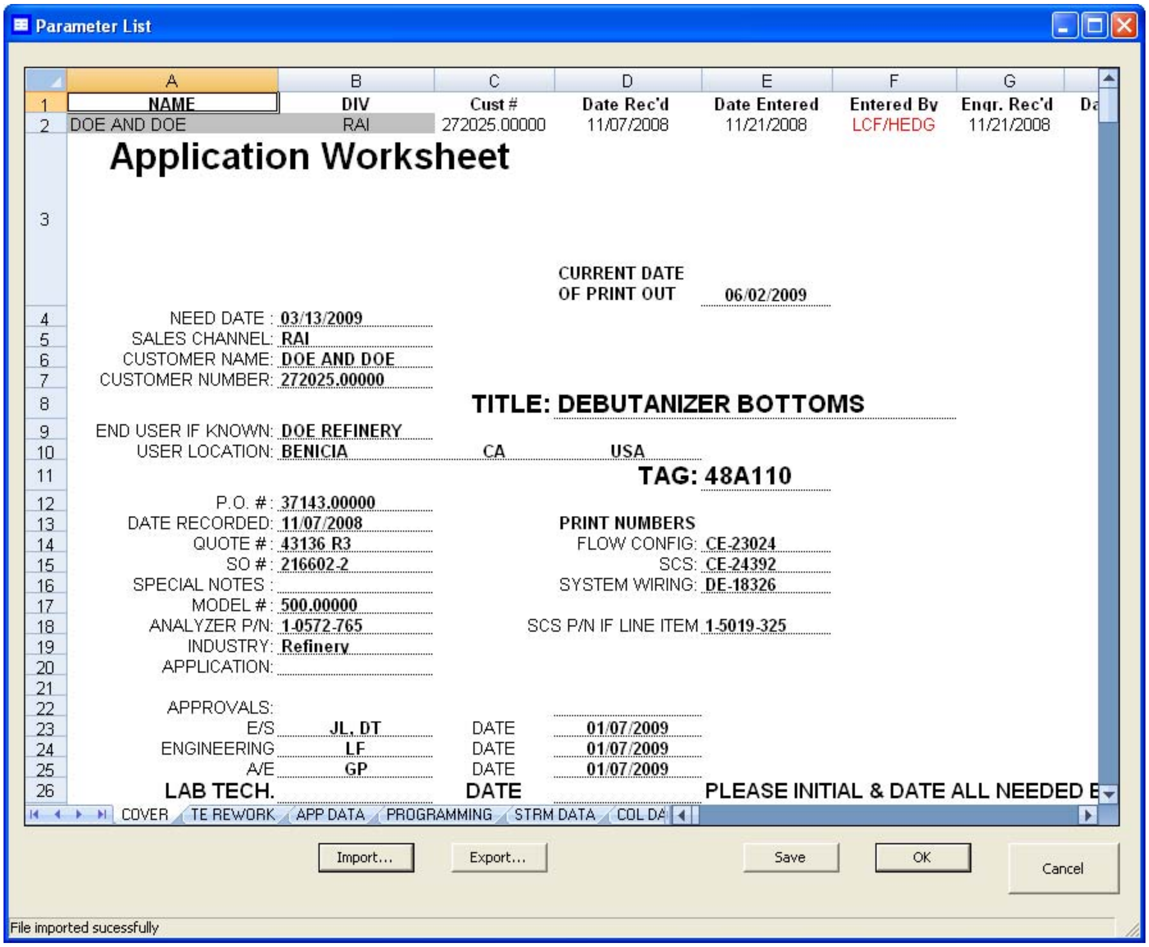


Figure 5-7. The Parameter List window

2. Make your changes to the Parameter List.
3. To save the changes and keep the window open, click **Save**. To save the changes and close the window, click **OK**.

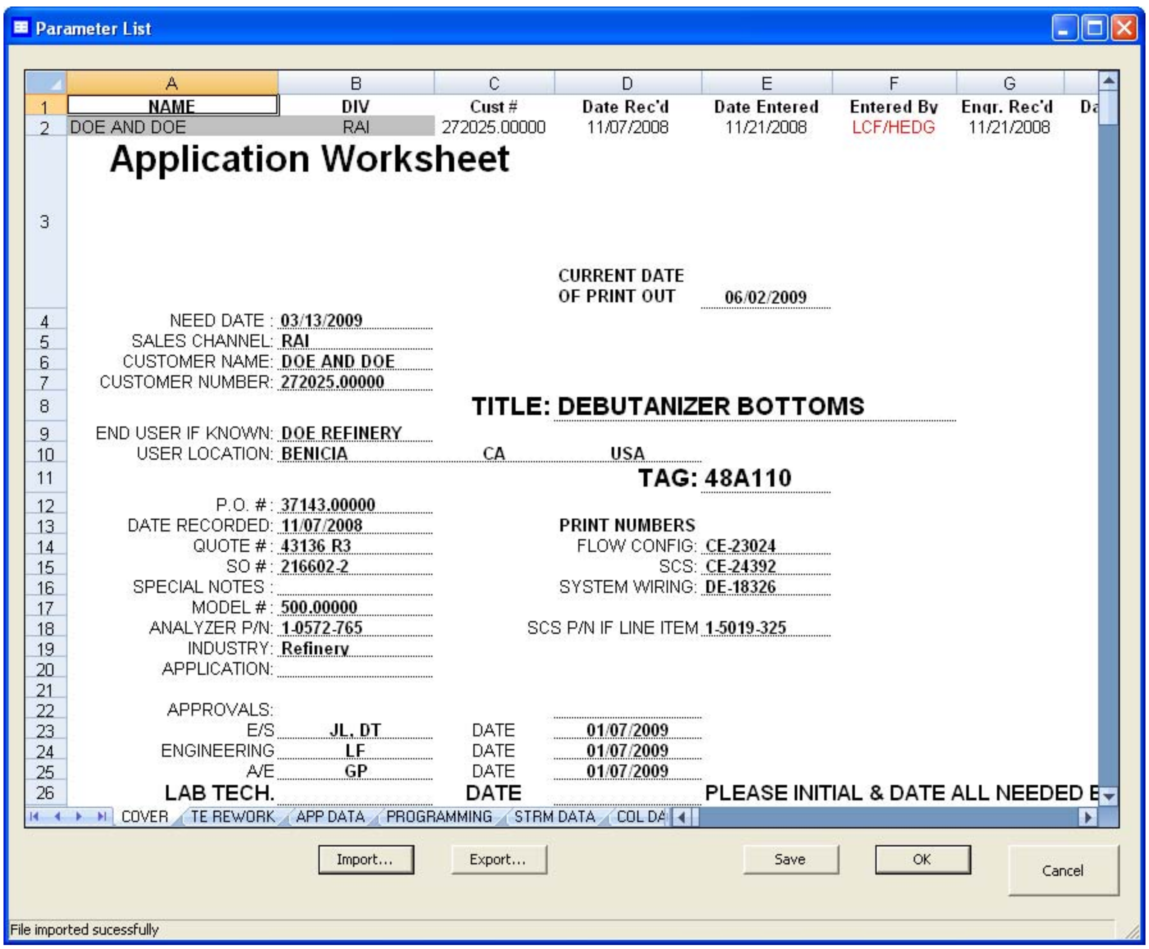
5.3.2 Importing and exporting the parameter list

The Parameter List is a Microsoft Excel document and is therefore saved with the .xls extension.

To import a Parameter List, do the following:

1. Select **Parameter List...** from the **Logs/Reports** menu. The *Parameter List* window displays.

Figure 5-8. The Parameter List window



2. Click **Import...**. The *Open* dialog displays.
3. Locate and select the Parameter List that you want to import.
4. Click **Open** and the document will be imported and displayed in the *Parameter List* window.
5. To save the changes and keep the window open, click **Save**. To save the changes and close the window, click **OK**. This Parameter List will now be displayed by default whenever **Parameter List...** is selected from the **Logs/Reports** menu.

To export the Parameter List, do the following:

1. Click **Export...**. The *Save as* dialog displays.
2. Navigate to the folder to which you want to save the file.
3. Click **Save**. The Parameter List will be saved with the .xls extension.
4. To save the changes and keep the window open, click **Save**. To save the changes and close the window, click **OK**. This Parameter List will now be displayed by default whenever **Parameter List...** is selected from the **Logs/Reports** menu.

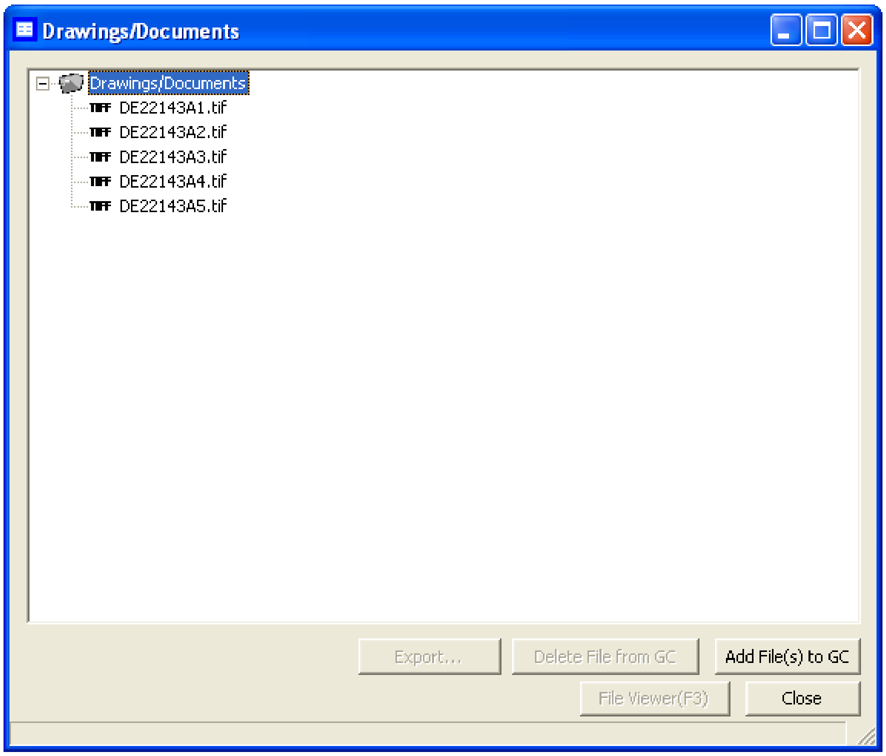
5.4 Working with drawings and documents

Use this feature to access GC-related drawings and documents such as flow diagrams, the GC's sales order, assembly drawings, and electrical diagrams. These items are stored on the GC in the following formats:

- PDF
- TIFF
- GC Trend file (.xtrd)
- XA CGM file (.xcgm)
- XA Comparison file (.xcpm)
- GC Configuration file (.xcfg)

To find out which documents are available on the GC, select **Drawings/ Documents...** from the **Logs/Reports** menu. The *Drawings/Documents* window displays.

Figure 5-9. The Drawings/Documents window



If the list of available documents does not display under *Drawings/ Documents* label, click the “+” beside the label.

Note

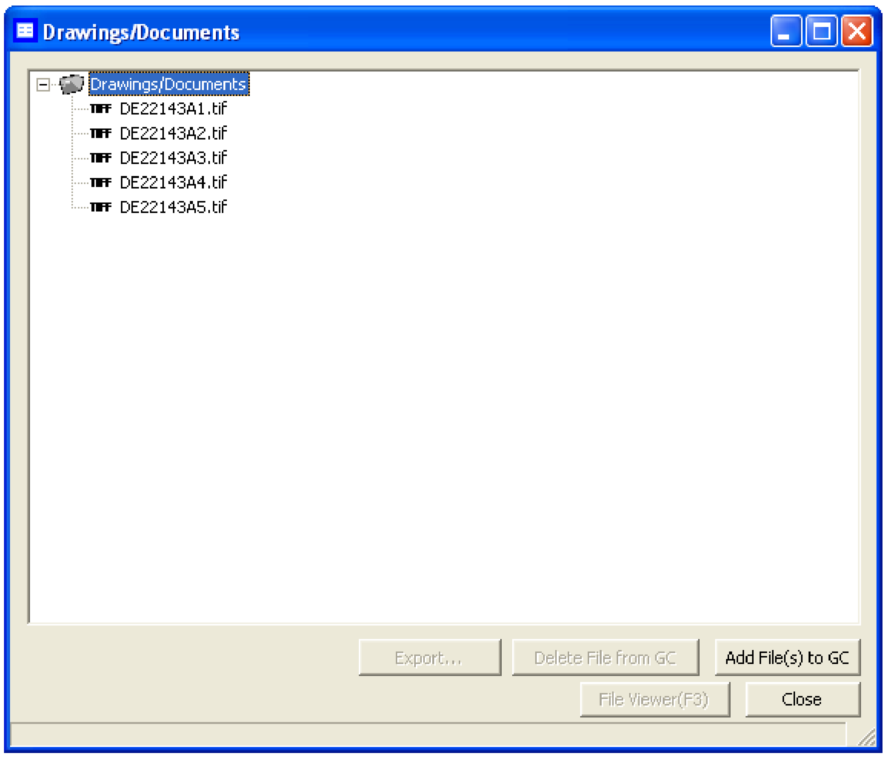
If no list displays under the *Drawings/Documents* label, and there is no “+” beside the label, then this GC does not contain any documents.

5.4.1 Viewing drawings or documents

To view a drawing, do the following:

1. Select **Drawings/Documents...** from the **Logs/Reports** menu. The *Drawings/Documents* window displays.

Figure 5-10. The Drawings/Documents window

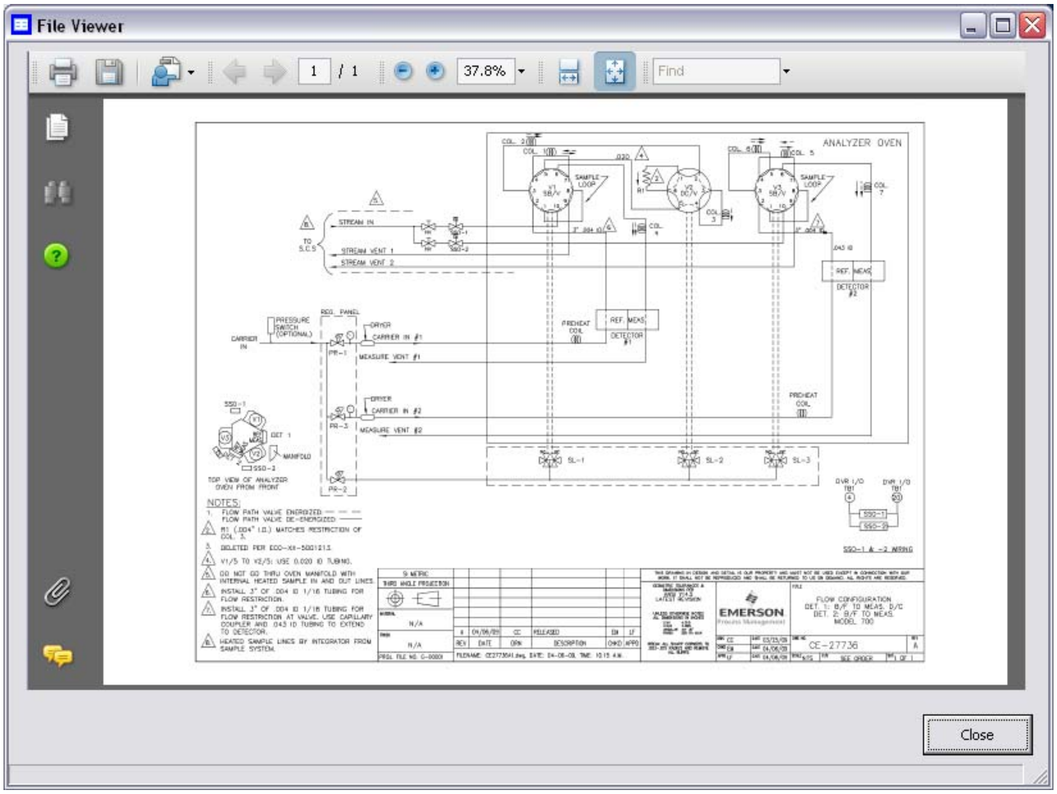


2. Select the drawing to view from the drop-down list.

Note
If no list displays under the *Drawings/Documents* label, and there is no "+" beside the label, then this GC does not contain any documents.

3. Click **File Viewer (F3)**. The drawing displays.

Figure 5-11. The File Viewer



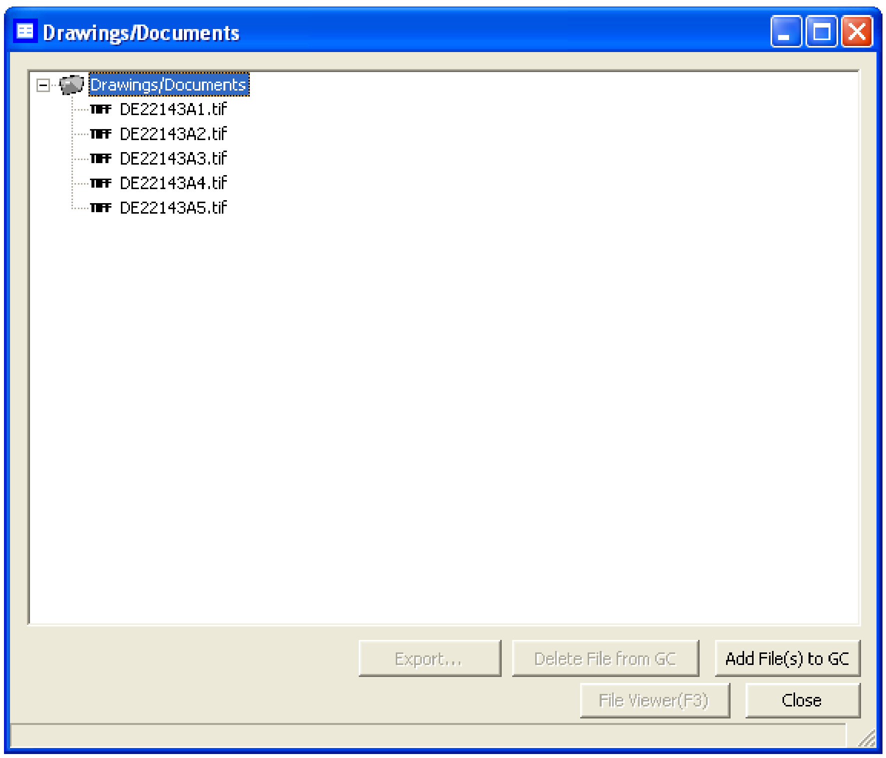
4. Click **Close** to exit the window and to return to the *Drawings/ Documents* window.

5.4.2 Adding files to the GC

To add files, such as new or updated drawings, to the GC, do the following:

1. Select **Drawings/Documents...** from the **Logs/Reports** menu. The *Drawings/Documents* window displays.

Figure 5-12. The Drawings/Documents window



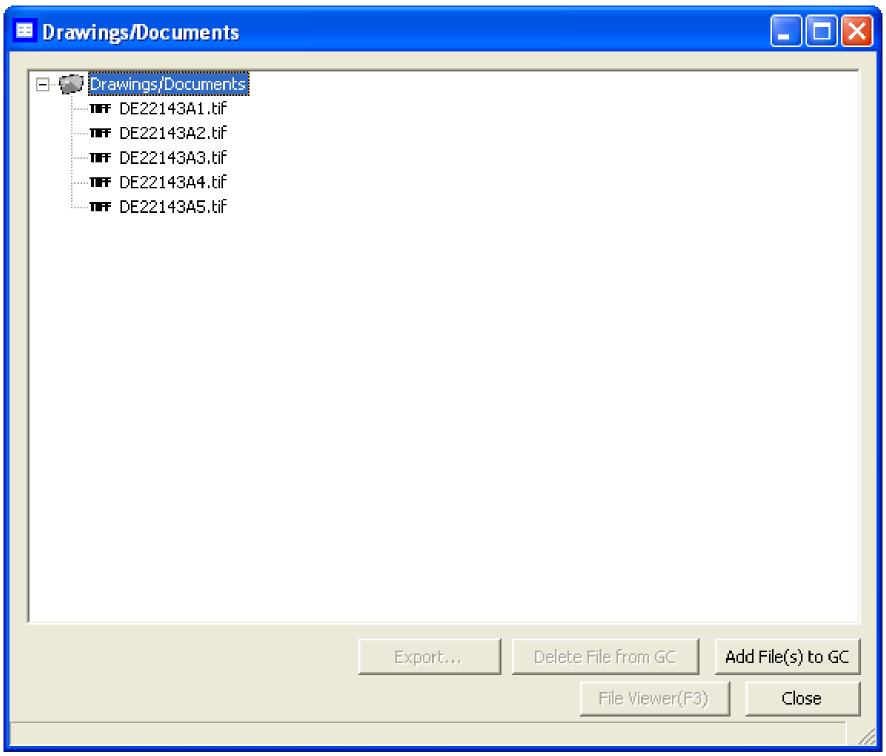
2. Click **Add File(s) to GC**. The *Open* dialog displays.
3. Locate and select the file to add to the GC.
4. Click **Open**. The file will be saved to the GC and the *Drawings/Documents* list will be updated.

5.4.3 Deleting files from the GC

To delete drawings from the GC, do the following:

1. Select **Drawings/Documents**... from the **Logs/Reports** menu. The *Drawings/Documents* window displays.

Figure 5-13. The Drawings/Documents window



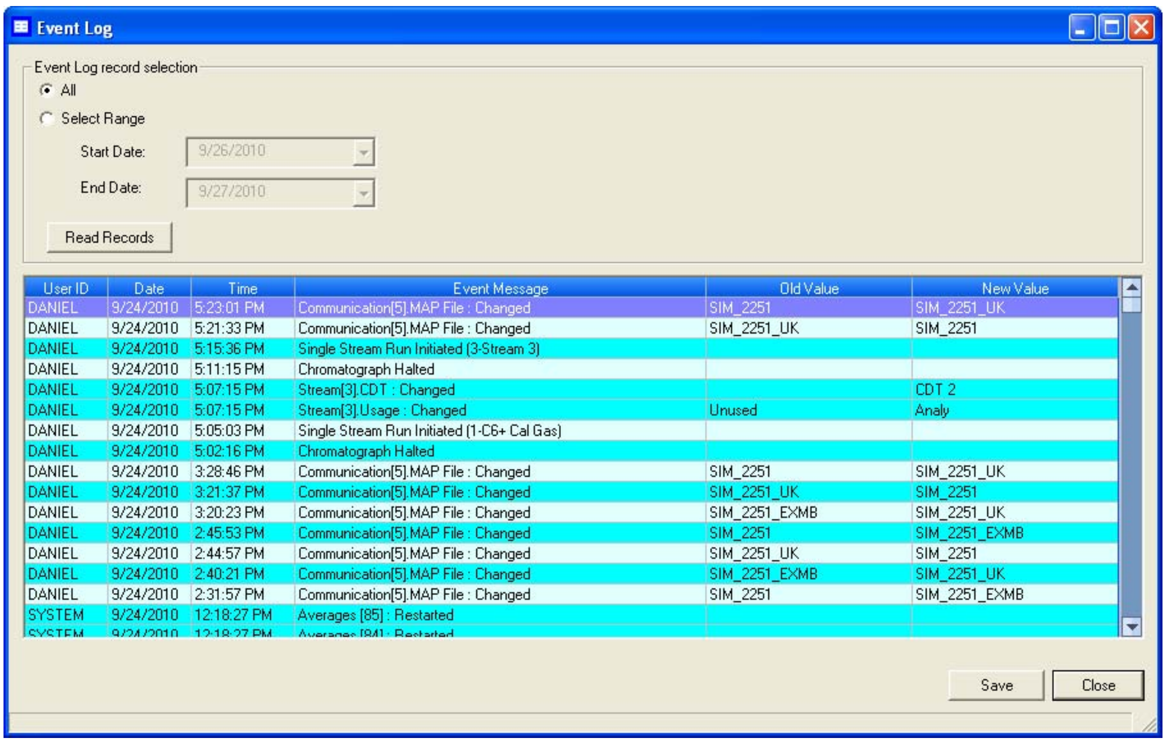
2. Select the file to delete from the GC.
3. Click **Delete File from GC**. The *Confirm* message displays.
4. Click **Yes**. The file will be deleted from the GC and the *Drawings/ Documents* list will be updated.

5.5 Viewing the event log

Use this function to track the changes that are made to the various tables within the GC.

To view the Event Log, select **Logs/Reports** → **Event Log...**. The *Event Log* window displays.

Figure 5-14. The Event Log window



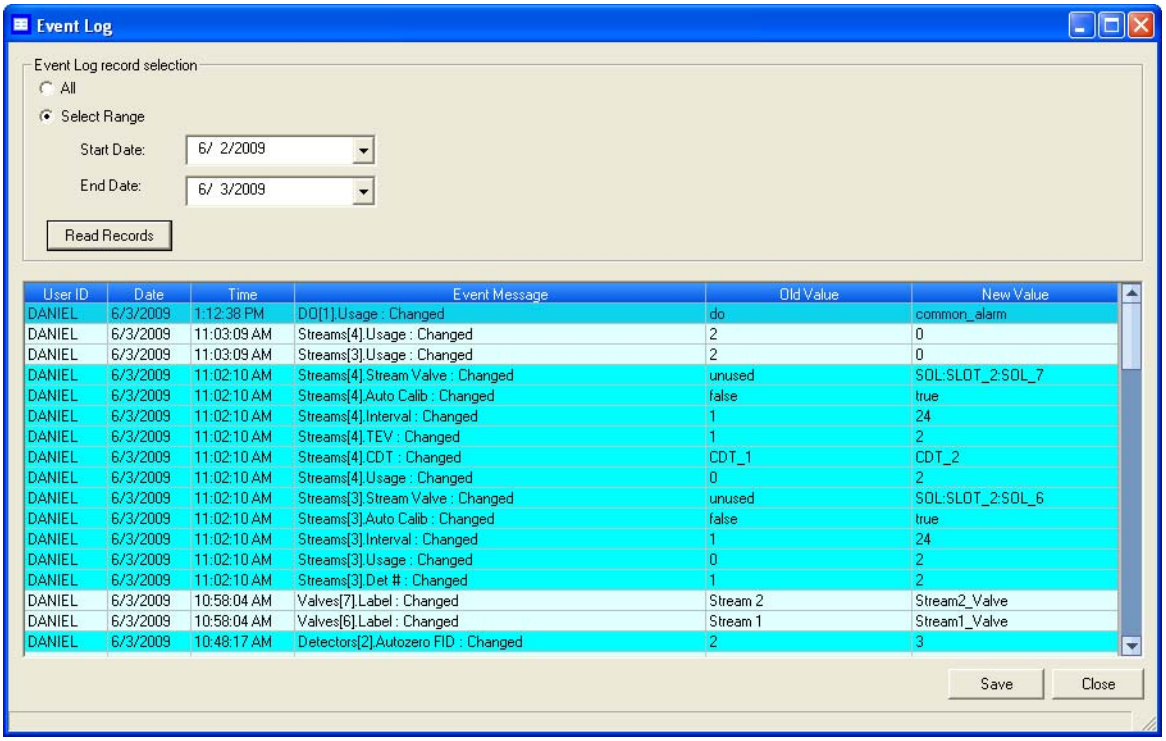
The *Event Log* window gives you the option of viewing the total list of change events, or a date-filtered list of events. The *Event Log* window supplies the following data for each event:

Name	Description
User ID	Indicates which user made the change.
Date	Indicates the date at the GC when the event occurred.
Time	Indicates the time at the GC when the event occurred.
Event Message	Provides a description of the event.
Old Value	If applicable, indicates the value in the cell before the change.
New Value	If applicable, indicates the value in the cell after change.

To view the list of change events, do the following:

1. To view all events, select the *All* checkbox. Otherwise, select the *Select Range* checkbox and use the *Start Date* and *End Date* drop-down boxes to select a date range.
2. Click **Read Records**. The list of events display with the most recent event at the top and the oldest event at the bottom. The events are also sorted and color-coded by time so that events that occurred simultaneously are grouped together.

Figure 5-15. The Event Log



3. To save the list, click **Save**. The list can be saved in the following formats:
   - Tab-Delimited (.txt)
   - Comma-Delimited (.csv)
   - Microsoft Excel (.xls)
   - HTML File (.html)
   - XML File (.xml)

5.6 Displaying reports

This function allows you to immediately display, print, or store preconfigured reports of GC analysis data. Data is reported in real-time from the GC or from saved files.

5.6.1 Understanding report types

MON 20/20 can generate the following types of reports:

- **Analysis**: Displays a list of the components that were detected, based on raw data. Displays a list of calculations for each component, based on the table located at **Application** → **Calculations** → **Control...**. See "Setting standard calculations by stream" on page 4-37 for more information.

  There are two types of analysis reports: *Analysis (GPA)* and *Analysis (ISO)*. See page 5-25 for an example Analysis (GPA) report. See page 5-26 for an example Analysis (ISO) report.

- **Calibration**: Displays a list of the components that were detected, along with each component's calibration concentration, raw data value, new response factor, and new retention time. See page 5-27 for an example report.

- **Final Calibration**: The Final Calibration report displays the list of components along with each component's old and new response factors, and each component's old and new retention times, based on the averaged data. See page 5-28 for an example report.

- **Validation**: For the most recent validation cycle, displays the Nominal Value, Allowed Percent Deviation, and the Measured Value of each variable in the Validation Data table. See page 5-29 for an example report.

Note
If the actual deviation is beyond the allowed amount, then the row will be flagged with an *.

- **Final Validation**: For the most recent validation run, shows the Nominal Value, Allowed Percent Deviation, and the Average Value of each variable in the Validation Data table. See page 5-30 for an example report.

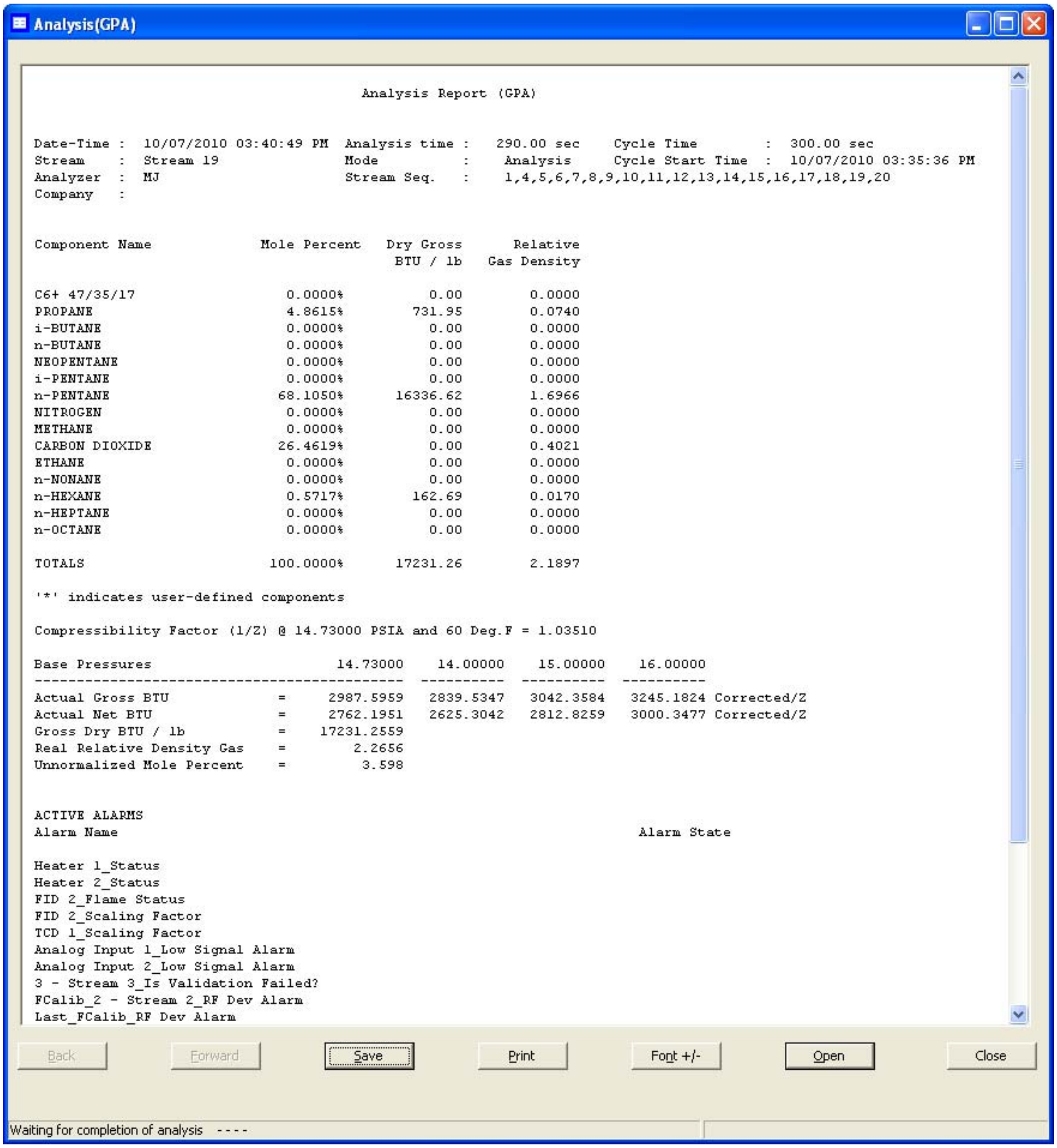
Note
If the actual deviation is beyond the allowed amount, then the row will be flagged with an *.

- **Raw Data**: Displays a list of data for each peak that was detected during the run, including the retention time, peak area, and peak height. See page 5-31 for an example report.
- **Every Run**: Displays a configurable list of calculations after each run. See "Editing average calculations" on page 4-39 for more information.
- **Hourly**: Displays a configurable list of average calculations each hour, beginning at the time set in the **Average Calculations** window at **Application** → **Calculations** → **Averages...**. See "Editing average calculations" on page 4-39 for more information.
- **24 Hour**: Displays a configurable list of average calculations each day, beginning at the time set in the **Average Calculations** window at **Application** → **Calculations** → **Averages...**. See "Editing average calculations" on page 4-39 for more information.
- **Weekly**: Displays a configurable list of average calculations each week, beginning on the day set in the **Average Calculations** window at **Application** → **Calculations** → **Averages...**. See "Editing average calculations" on page 4-39 for more information.
- **Monthly**: Displays a configurable list of average calculations each month, beginning on the day of the month set in the **Average Calculations** window at **Application** → **Calculations** → **Averages...**. See "Editing average calculations" on page 4-39 for more information.
- **Variable**: Displays a configurable list of average calculations every hour at the time entered in the **Hours** column in the **Average Calculations** window at **Application** → **Calculations** → **Averages...**. See "Editing average calculations" on page 4-39 for more information.

Each report begins with the following header information:

- **Date-Time**: The GC's date and time when the report was generated.
- **Analysis Time**: The duration, in seconds, of the analysis. Can be configured at **Application** → **Timed Events...**. See "Setting the cycle and analysis time" on page 4-29 for more information.
- **Cycle Time**: The duration, in seconds, between two consecutive analyses. Can be configured at **Application** → **Timed Events...**. See "Setting the cycle and analysis time" on page 4-29 for more information.
- **Stream**: The stream that was analyzed. Selected as part of the report generation process. See "Viewing a saved report" on page 5-35 for more information.
- **Mode**: Displays the operational status of the detector.
- **Cycle Start Time**: The date and time that the cycle started.
- **Analyzer**: Name of the GC that generated the data used for the report.
- **Stream Sequence**: The identification and order of the streams that were analyzed. Can be configured at **Applications** → **Stream Sequence...**. See "Creating a stream sequence for a detector" on page 4-78 for more information.

Figure 5-16. Analysis (GPA) sample report



Analysis(GPA)

```
                              Analysis Report (GPA)

Date-Time :  10/07/2010 03:40:49 PM  Analysis time :   290.00 sec    Cycle Time        :  300.00 sec
Stream    :  Stream 19               Mode          :   Analysis      Cycle Start Time  :  10/07/2010 03:35:36 PM
Analyzer  :  MJ                      Stream Seq.   :   1,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20
Company   :

Component Name              Mole Percent   Dry Gross      Relative
                                            BTU / lb   Gas Density

C6+ 47/35/17                   0.0000%        0.00        0.0000
PROPANE                        4.8615%      731.95        0.0740
i-BUTANE                       0.0000%        0.00        0.0000
n-BUTANE                       0.0000%        0.00        0.0000
NEOPENTANE                     0.0000%        0.00        0.0000
i-PENTANE                      0.0000%        0.00        0.0000
n-PENTANE                     68.1050%    16336.62        1.6966
NITROGEN                       0.0000%        0.00        0.0000
METHANE                        0.0000%        0.00        0.0000
CARBON DIOXIDE                26.4619%        0.00        0.4021
ETHANE                         0.0000%        0.00        0.0000
n-NONANE                       0.0000%        0.00        0.0000
n-HEXANE                       0.5717%      162.69        0.0170
n-HEPTANE                      0.0000%        0.00        0.0000
n-OCTANE                       0.0000%        0.00        0.0000

TOTALS                       100.0000%    17231.26        2.1897

'*' indicates user-defined components

Compressibility Factor (1/Z) @ 14.73000 PSIA and 60 Deg.F = 1.03510

Base Pressures                       14.73000    14.00000    15.00000    16.00000
--------------------------------------------  ----------  ----------  ----------
Actual Gross BTU             =      2987.5959   2839.5347   3042.3584   3245.1824 Corrected/Z
Actual Net BTU               =      2762.1951   2625.3042   2812.8259   3000.3477 Corrected/Z
Gross Dry BTU / lb           =     17231.2559
Real Relative Density Gas    =         2.2656
Unnormalized Mole Percent    =          3.598


ACTIVE ALARMS
Alarm Name                                                                 Alarm State

Heater 1_Status
Heater 2_Status
FID 2_Flame Status
FID 2_Scaling Factor
TCD 1_Scaling Factor
Analog Input 1_Low Signal Alarm
Analog Input 2_Low Signal Alarm
3 - Stream 3_Is Validation Failed?
FCalib_2 - Stream 2_RF Dev Alarm
Last_FCalib_RF Dev Alarm
```

Back | Forward | Save | Print | Font +/- | Open | Close

Waiting for completion of analysis ----

Figure 5-17. Analysis (ISO) sample report

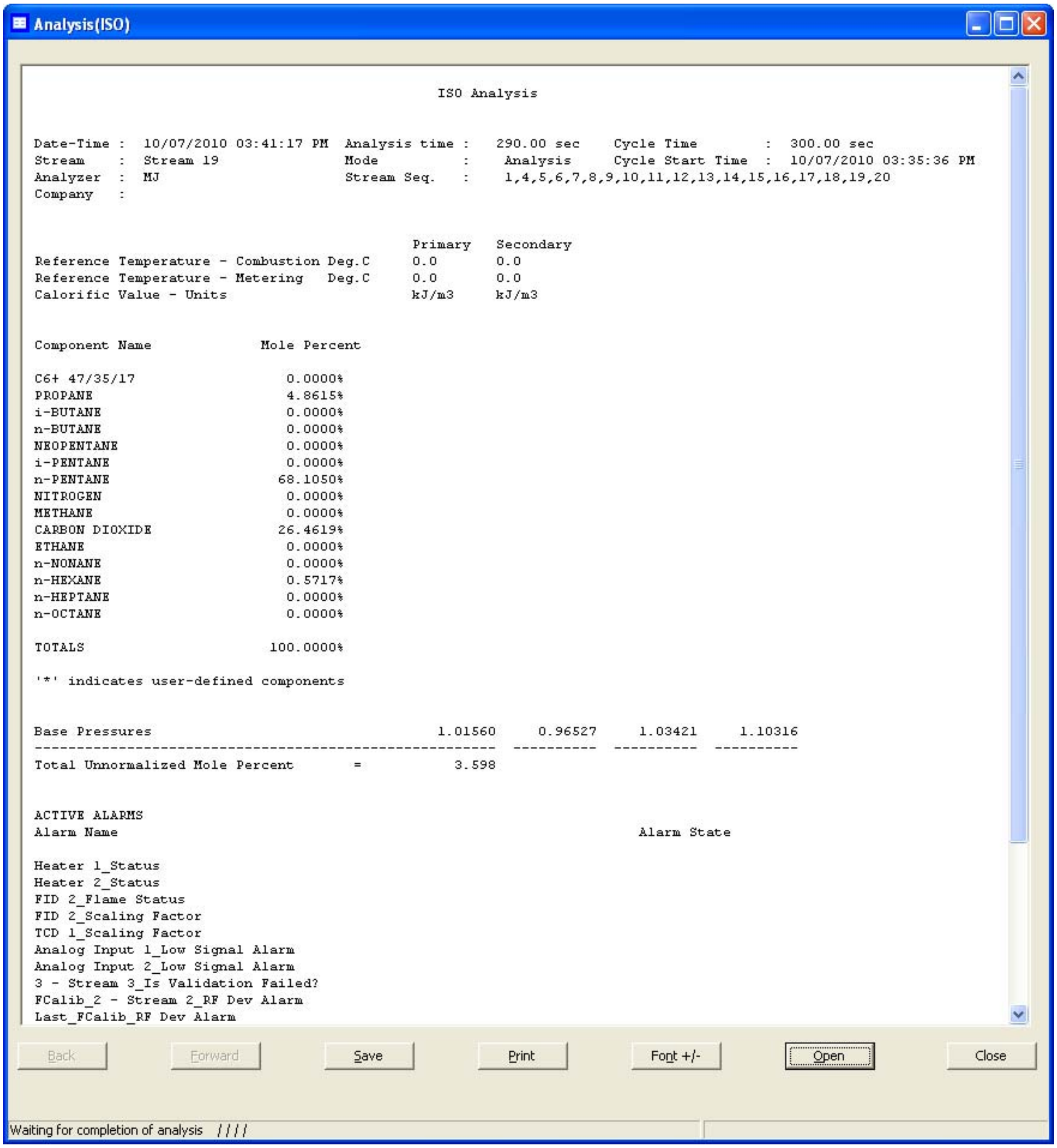
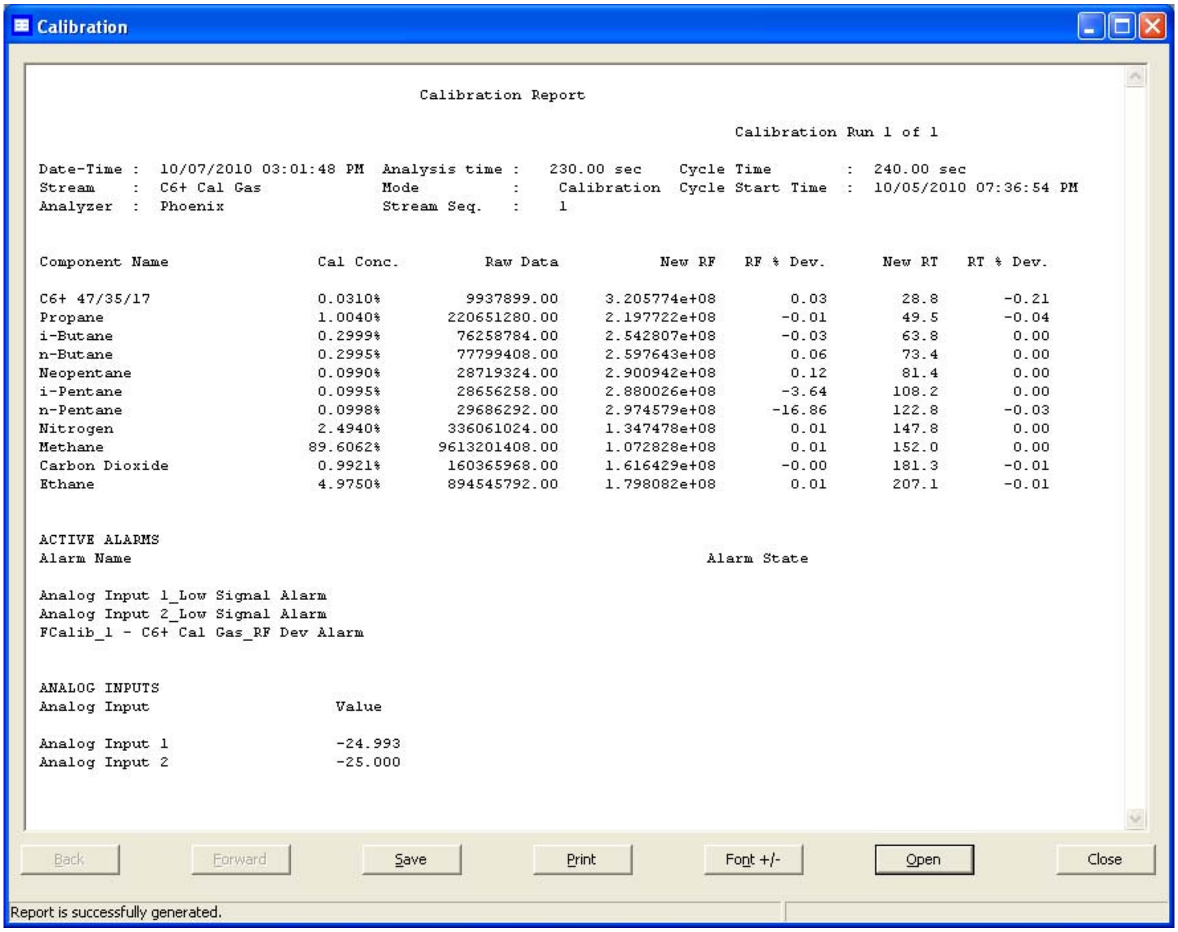


Figure 5-18. Calibration sample report



Calibration Report

Calibration Run 1 of 1

Date-Time : 10/07/2010 03:01:48 PM	Analysis time : 230.00 sec	Cycle Time : 240.00 sec	
Stream : C6+ Cal Gas	Mode : Calibration	Cycle Start Time : 10/05/2010 07:36:54 PM	
Analyzer : Phoenix	Stream Seq. : 1		

Component Name	Cal Conc.	Raw Data	New RF	RF % Dev.	New RT	RT % Dev.
C6+ 47/35/17	0.0310%	9937899.00	3.205774e+08	0.03	28.8	-0.21
Propane	1.0040%	220651280.00	2.197722e+08	-0.01	49.5	-0.04
i-Butane	0.2999%	76258784.00	2.542807e+08	-0.03	63.8	0.00
n-Butane	0.2995%	77799408.00	2.597643e+08	0.06	73.4	0.00
Neopentane	0.0990%	28719324.00	2.900942e+08	0.12	81.4	0.00
i-Pentane	0.0995%	28656258.00	2.880026e+08	-3.64	108.2	0.00
n-Pentane	0.0998%	29686292.00	2.974579e+08	-16.86	122.8	-0.03
Nitrogen	2.4940%	336061024.00	1.347478e+08	0.01	147.8	0.00
Methane	89.6062%	9613201408.00	1.072828e+08	0.01	152.0	0.00
Carbon Dioxide	0.9921%	160365968.00	1.616429e+08	-0.00	181.3	-0.01
Ethane	4.9750%	894545792.00	1.798082e+08	0.01	207.1	-0.01

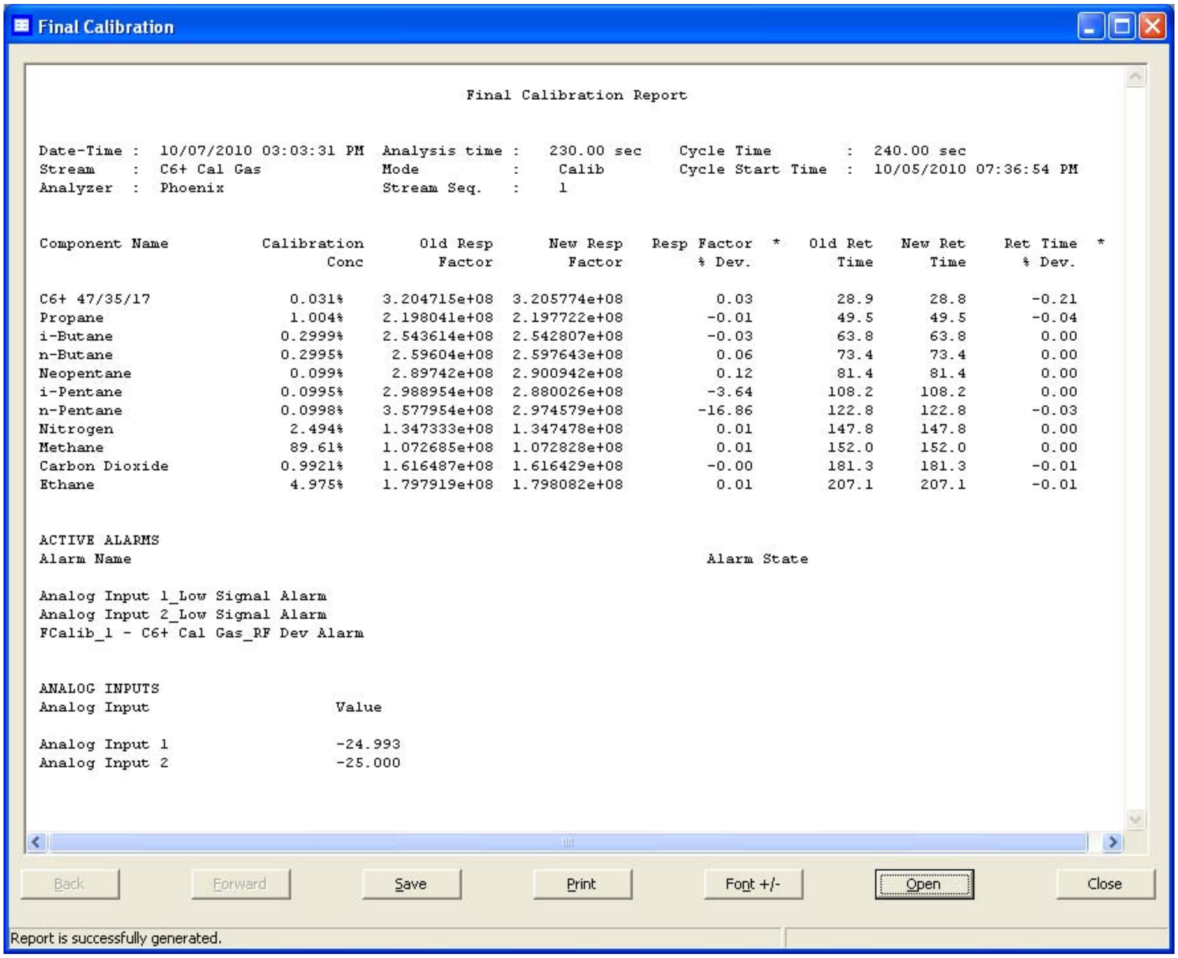
ACTIVE ALARMS

Alarm Name	Alarm State
Analog Input 1_Low Signal Alarm	
Analog Input 2_Low Signal Alarm	
FCalib_1 - C6+ Cal Gas_RF Dev Alarm	

ANALOG INPUTS

Analog Input	Value
Analog Input 1	-24.993
Analog Input 2	-25.000

Figure 5-19. Final Calibration sample report



Final Calibration Report

```
Date-Time :  10/07/2010 03:03:31 PM  Analysis time :   230.00 sec    Cycle Time        :  240.00 sec
Stream    :  C6+ Cal Gas             Mode          :    Calib        Cycle Start Time  :  10/05/2010 07:36:54 PM
Analyzer  :  Phoenix                 Stream Seq.   :    1
```

Component Name	Calibration Conc	Old Resp Factor	New Resp Factor	Resp Factor % Dev. *	Old Ret Time	New Ret Time	Ret Time % Dev. *
C6+ 47/35/17	0.031%	3.204715e+08	3.205774e+08	0.03	28.9	28.8	-0.21
Propane	1.004%	2.198041e+08	2.197722e+08	-0.01	49.5	49.5	-0.04
i-Butane	0.2999%	2.543614e+08	2.542807e+08	-0.03	63.8	63.8	0.00
n-Butane	0.2995%	2.59604e+08	2.597643e+08	0.06	73.4	73.4	0.00
Neopentane	0.099%	2.89742e+08	2.900942e+08	0.12	81.4	81.4	0.00
i-Pentane	0.0995%	2.988954e+08	2.880026e+08	-3.64	108.2	108.2	0.00
n-Pentane	0.0998%	3.577954e+08	2.974579e+08	-16.86	122.8	122.8	-0.03
Nitrogen	2.494%	1.347333e+08	1.347478e+08	0.01	147.8	147.8	0.00
Methane	89.61%	1.072685e+08	1.072828e+08	0.01	152.0	152.0	0.00
Carbon Dioxide	0.9921%	1.616487e+08	1.616429e+08	-0.00	181.3	181.3	-0.01
Ethane	4.975%	1.797919e+08	1.798082e+08	0.01	207.1	207.1	-0.01

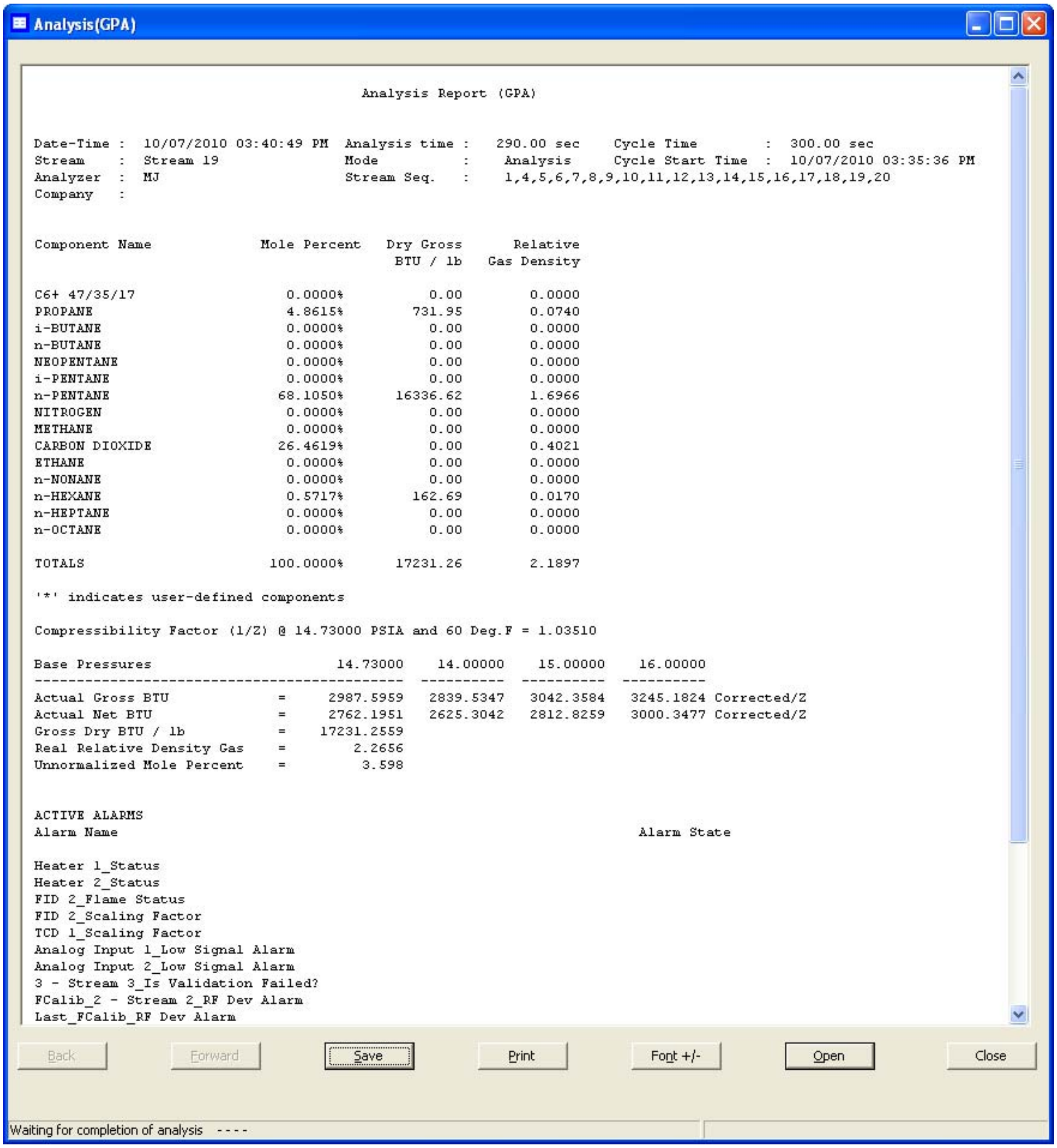
ACTIVE ALARMS

Alarm Name	Alarm State
Analog Input 1_Low Signal Alarm	
Analog Input 2_Low Signal Alarm	
FCalib_1 - C6+ Cal Gas_RF Dev Alarm	

ANALOG INPUTS

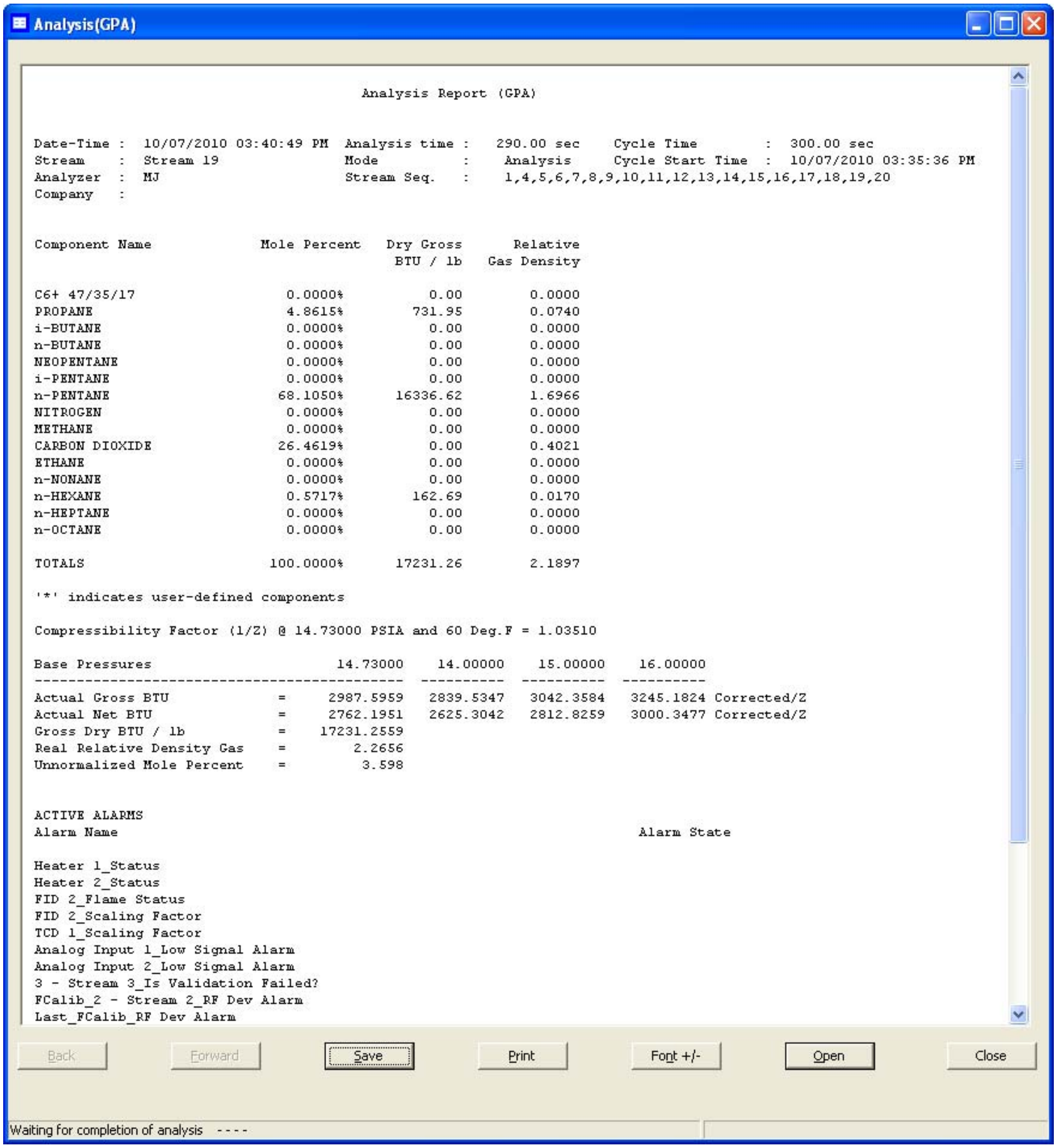
Analog Input	Value
Analog Input 1	-24.993
Analog Input 2	-25.000

Figure 5-20. Validation sample report



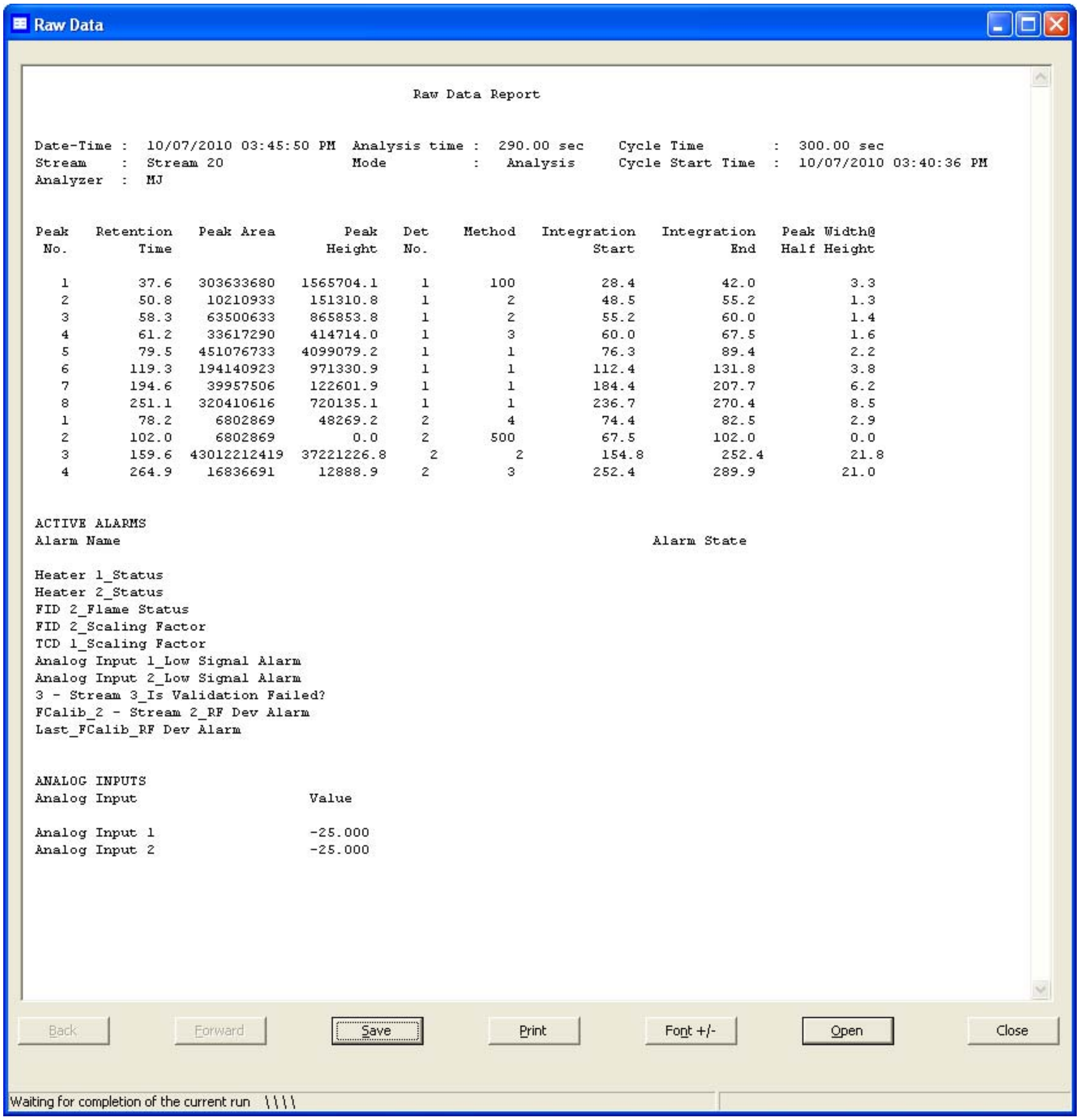

```
                                        Analysis Report (GPA)

Date-Time :  10/07/2010 03:40:49 PM  Analysis time :   290.00 sec    Cycle Time         :  300.00 sec
Stream    :  Stream 19               Mode          :   Analysis      Cycle Start Time   :  10/07/2010 03:35:36 PM
Analyzer  :  MJ                      Stream Seq.   :   1,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20
Company   :

Component Name            Mole Percent   Dry Gross      Relative
                                          BTU / lb    Gas Density

C6+ 47/35/17                 0.0000%          0.00        0.0000
PROPANE                      4.8615%        731.95        0.0740
i-BUTANE                     0.0000%          0.00        0.0000
n-BUTANE                     0.0000%          0.00        0.0000
NEOPENTANE                   0.0000%          0.00        0.0000
i-PENTANE                    0.0000%          0.00        0.0000
n-PENTANE                   68.1050%      16336.62        1.6966
NITROGEN                     0.0000%          0.00        0.0000
METHANE                      0.0000%          0.00        0.0000
CARBON DIOXIDE              26.4619%          0.00        0.4021
ETHANE                       0.0000%          0.00        0.0000
n-NONANE                     0.0000%          0.00        0.0000
n-HEXANE                     0.5717%        162.69        0.0170
n-HEPTANE                    0.0000%          0.00        0.0000
n-OCTANE                     0.0000%          0.00        0.0000

TOTALS                     100.0000%      17231.26        2.1897

'*' indicates user-defined components

Compressibility Factor (1/Z) @ 14.73000 PSIA and 60 Deg.F = 1.03510

Base Pressures                      14.73000    14.00000    15.00000    16.00000
--------------------------------------------  ----------  ----------  ----------
Actual Gross BTU            =      2987.5959   2839.5347   3042.3584   3245.1824 Corrected/Z
Actual Net BTU              =      2762.1951   2625.3042   2812.8259   3000.3477 Corrected/Z
Gross Dry BTU / lb          =     17231.2559
Real Relative Density Gas   =         2.2656
Unnormalized Mole Percent   =          3.598


ACTIVE ALARMS
Alarm Name                                                          Alarm State

Heater 1_Status
Heater 2_Status
FID 2_Flame Status
FID 2_Scaling Factor
TCD 1_Scaling Factor
Analog Input 1_Low Signal Alarm
Analog Input 2_Low Signal Alarm
3 - Stream 3_Is Validation Failed?
FCalib_2 - Stream 2_RF Dev Alarm
Last_FCalib_RF Dev Alarm
```

Figure 5-21. Final Validation sample report




```
                                Analysis Report (GPA)

Date-Time :  10/07/2010 03:40:49 PM  Analysis time :   290.00 sec    Cycle Time        :  300.00 sec
Stream    :  Stream 19               Mode          :    Analysis     Cycle Start Time  :  10/07/2010 03:35:36 PM
Analyzer  :  MJ                      Stream Seq.   :    1,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20
Company   :

Component Name             Mole Percent   Dry Gross      Relative
                                           BTU / lb    Gas Density

C6+ 47/35/17                  0.0000%         0.00        0.0000
PROPANE                       4.8615%       731.95        0.0740
i-BUTANE                      0.0000%         0.00        0.0000
n-BUTANE                      0.0000%         0.00        0.0000
NEOPENTANE                    0.0000%         0.00        0.0000
i-PENTANE                     0.0000%         0.00        0.0000
n-PENTANE                    68.1050%     16336.62        1.6966
NITROGEN                      0.0000%         0.00        0.0000
METHANE                       0.0000%         0.00        0.0000
CARBON DIOXIDE               26.4619%         0.00        0.4021
ETHANE                        0.0000%         0.00        0.0000
n-NONANE                      0.0000%         0.00        0.0000
n-HEXANE                      0.5717%       162.69        0.0170
n-HEPTANE                     0.0000%         0.00        0.0000
n-OCTANE                      0.0000%         0.00        0.0000

TOTALS                      100.0000%     17231.26        2.1897

'*' indicates user-defined components

Compressibility Factor (1/Z) @ 14.73000 PSIA and 60 Deg.F = 1.03510

Base Pressures                        14.73000    14.00000    15.00000    16.00000
--------------------------------------------  ----------  ----------  ----------
Actual Gross BTU               =     2987.5959   2839.5347   3042.3584   3245.1824 Corrected/Z
Actual Net BTU                 =     2762.1951   2625.3042   2812.8259   3000.3477 Corrected/Z
Gross Dry BTU / lb             =    17231.2559
Real Relative Density Gas      =        2.2656
Unnormalized Mole Percent      =         3.598


ACTIVE ALARMS
Alarm Name                                                                  Alarm State

Heater 1_Status
Heater 2_Status
FID 2_Flame Status
FID 2_Scaling Factor
TCD 1_Scaling Factor
Analog Input 1_Low Signal Alarm
Analog Input 2_Low Signal Alarm
3 - Stream 3_Is Validation Failed?
FCalib_2 - Stream 2_RF Dev Alarm
Last_FCalib_RF Dev Alarm
```

Figure 5-22. RawData sample report


Raw Data

Raw Data Report

```
Date-Time :  10/07/2010 03:45:50 PM  Analysis time :  290.00 sec    Cycle Time        :  300.00 sec
Stream    :  Stream 20               Mode          :   Analysis     Cycle Start Time  :  10/07/2010 03:40:36 PM
Analyzer  :  MJ
```

Peak No.	Retention Time	Peak Area	Peak Height	Det No.	Method	Integration Start	Integration End	Peak Width@ Half Height
1	37.6	303633680	1565704.1	1	100	28.4	42.0	3.3
2	50.8	10210933	151310.8	1	2	48.5	55.2	1.3
3	58.3	63500633	865853.8	1	2	55.2	60.0	1.4
4	61.2	33617290	414714.0	1	3	60.0	67.5	1.6
5	79.5	451076733	4099079.2	1	1	76.3	89.4	2.2
6	119.3	194140923	971330.9	1	1	112.4	131.8	3.8
7	194.6	39957506	122601.9	1	1	184.4	207.7	6.2
8	251.1	320410616	720135.1	1	1	236.7	270.4	8.5
1	78.2	6802869	48269.2	2	4	74.4	82.5	2.9
2	102.0	6802869	0.0	2	500	67.5	102.0	0.0
3	159.6	43012212419	37221226.8	2	2	154.8	252.4	21.8
4	264.9	16836691	12888.9	2	3	252.4	289.9	21.0

ACTIVE ALARMS

Alarm Name	Alarm State
Heater 1_Status	
Heater 2_Status	
FID 2_Flame Status	
FID 2_Scaling Factor	
TCD 1_Scaling Factor	
Analog Input 1_Low Signal Alarm	
Analog Input 2_Low Signal Alarm	
3 - Stream 3_Is Validation Failed?	
FCalib_2 - Stream 2_RF Dev Alarm	
Last_FCalib_RF Dev Alarm	

ANALOG INPUTS

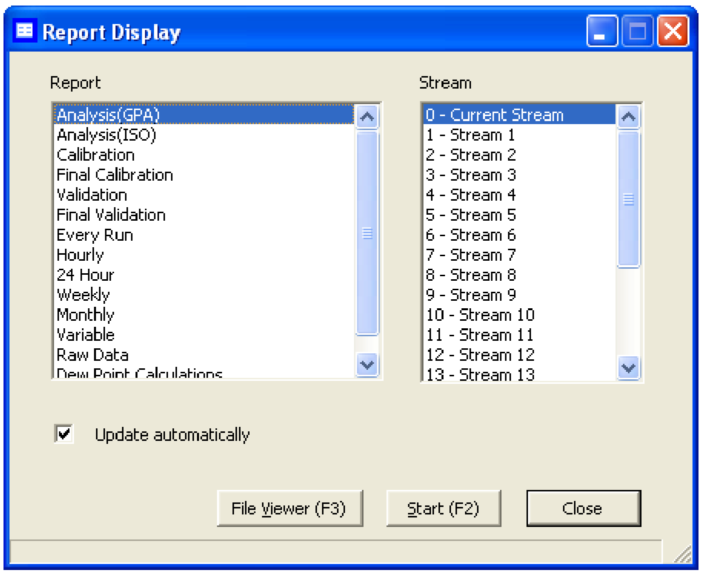
Analog Input	Value
Analog Input 1	-25.000
Analog Input 2	-25.000

5.6.2 Viewing reports from live data

To view a report created from the most recent data, do the following:

1. Select **Report Displays...** from the **Log/Reports** menu. The *Report Display* window appears.

Figure 5-23. The Report Display window



Note

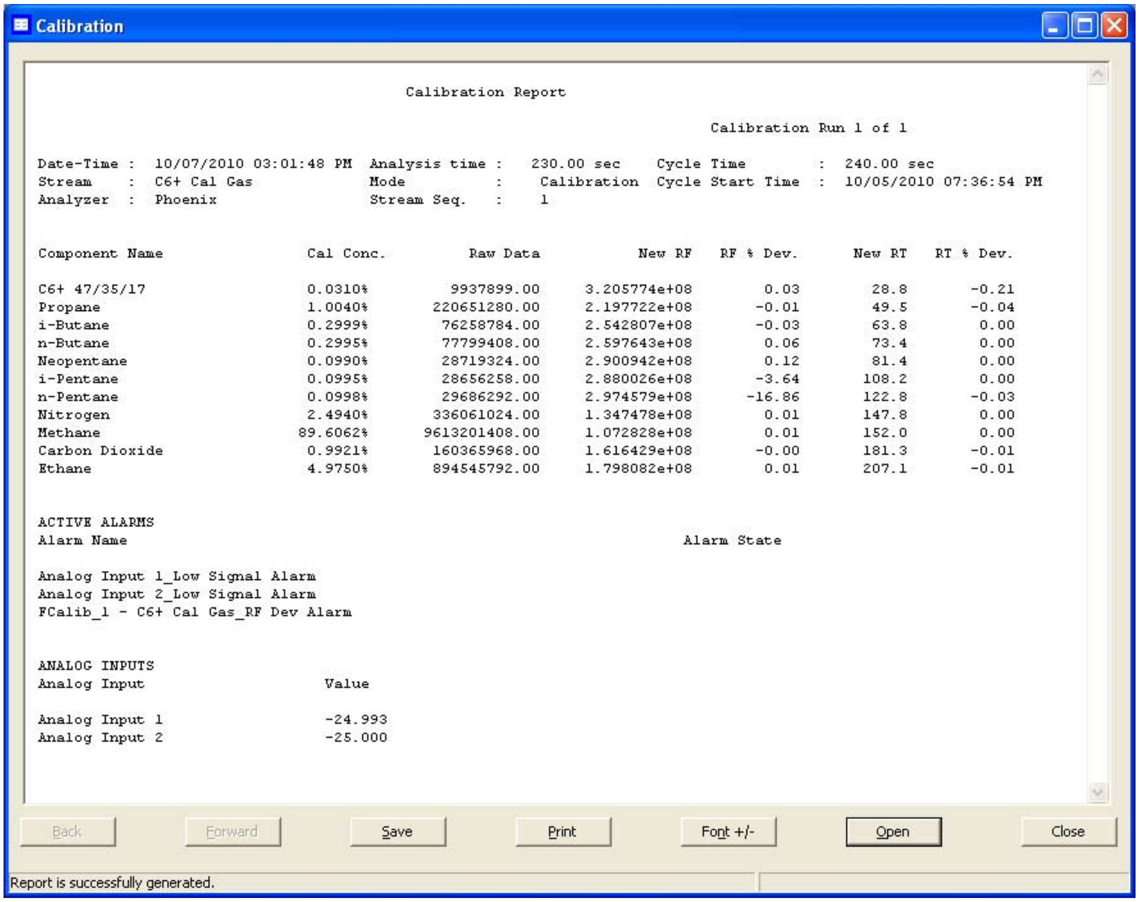
By default, the *Update automatically* checkbox is selected. This means that when viewing a report based on the most recent data, the report will refresh as new data is created, based on the type of report that you select.

For example, in the *Report Display* window, if you select Analysis (GPA), the report display will refresh each time the GC finishes an analysis of the selected stream.

The refresh function displays the newly generated report and deletes the previous report (unless already saved to disk).

2. Select the type of report to view from the following list:
   - Analysis (GPA)
   - Analysis (ISO)
   - Calibration
   - Final Calibration
   - Validation
   - Final Validation
   - Every Run
   - Hourly
   - 24 Hour
   - Weekly
   - Monthly
   - Variable
   - Raw data
3. Select the appropriate stream.
4. Click **Start (F2)**. The report displays.

Figure 5-24. The report window



Component Name	Cal Conc.	Raw Data	New RF	RF % Dev.	New RT	RT % Dev.
C6+ 47/35/17	0.0310%	9937899.00	3.205774e+08	0.03	28.8	-0.21
Propane	1.0040%	220651280.00	2.197722e+08	-0.01	49.5	-0.04
i-Butane	0.2999%	76258784.00	2.542807e+08	-0.03	63.8	0.00
n-Butane	0.2995%	77799408.00	2.597643e+08	0.06	73.4	0.00
Neopentane	0.0990%	28719324.00	2.900942e+08	0.12	81.4	0.00
i-Pentane	0.0995%	28656258.00	2.880026e+08	-3.64	108.2	0.00
n-Pentane	0.0998%	29686292.00	2.974579e+08	-16.86	122.8	-0.03
Nitrogen	2.4940%	336061024.00	1.347478e+08	0.01	147.8	0.00
Methane	89.6062%	9613201408.00	1.072828e+08	0.01	152.0	0.00
Carbon Dioxide	0.9921%	160365968.00	1.616429e+08	-0.00	181.3	-0.01
Ethane	4.9750%	894545792.00	1.798082e+08	0.01	207.1	-0.01

Note
If the report doesn't appear right away, check the status of the report generation process in the status bar, which is below the row of buttons on the report window.

5. To change the font size, click **Font**.. There are five preset font sizes available. Continue to click **Font** to cycle through the sizes until you are satisfied with the report's readability.

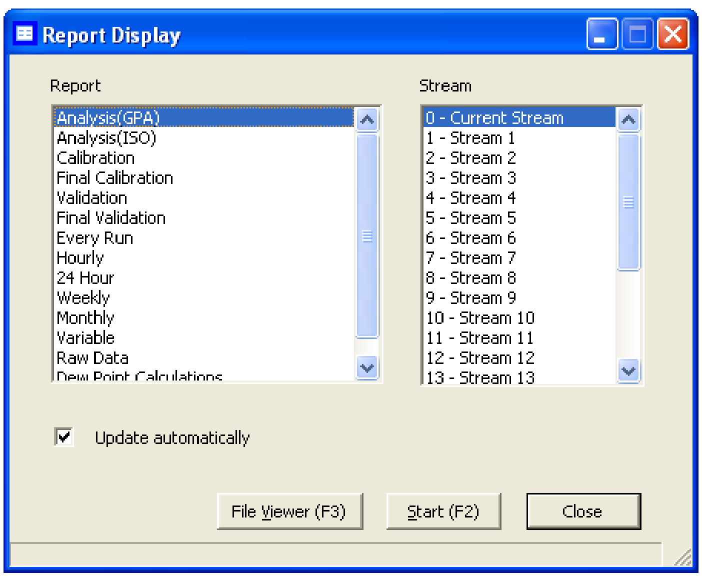
6. To save the file, click **Save**. The report can be saved in the following file formats:
   - TXT
   - HTM
   - HTML
   - MHT

5.6.3 Viewing a saved report

To view a saved report, do the following:

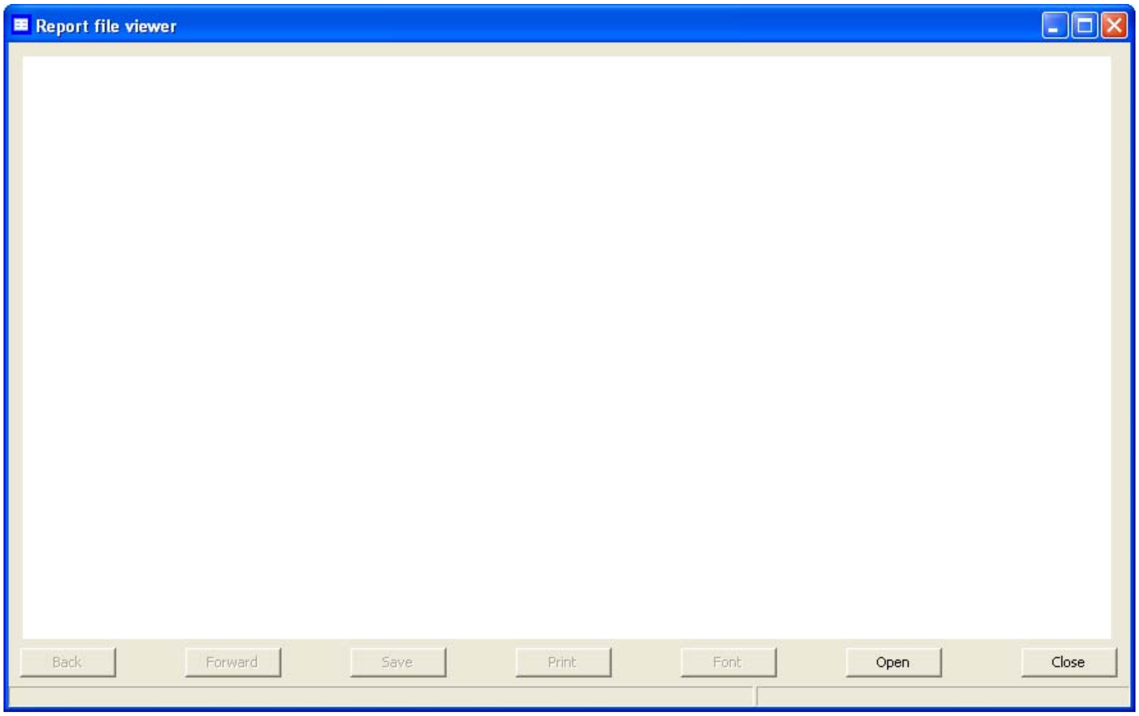
1. Select **Report Displays...** from the **Log/Reports** menu. The *Report Display* window appears.

Figure 5-25. The Report Display window



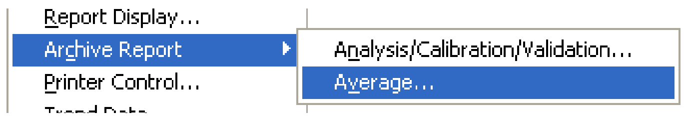
2. Click **File Viewer (F3)**. The *Report file viewer* window displays.

Figure 5-26. The Report file viewer window



3. Click **Open**. The *Open* dialog displays.
4. Locate and select the report that you want to view. Reports can be found in the following file formats:
   - TXT
   - RPT
   - HTM
   - HTML
   - MHT
5. Click **Open**. The report displays.
6. To change the font size, click **Font**.. There are five preset font sizes available. Continue to click **Font** to cycle through the sizes until you are satisfied with the report's readability.
7. To print the report, click **Print**.

5.7 Viewing reports based on archived data



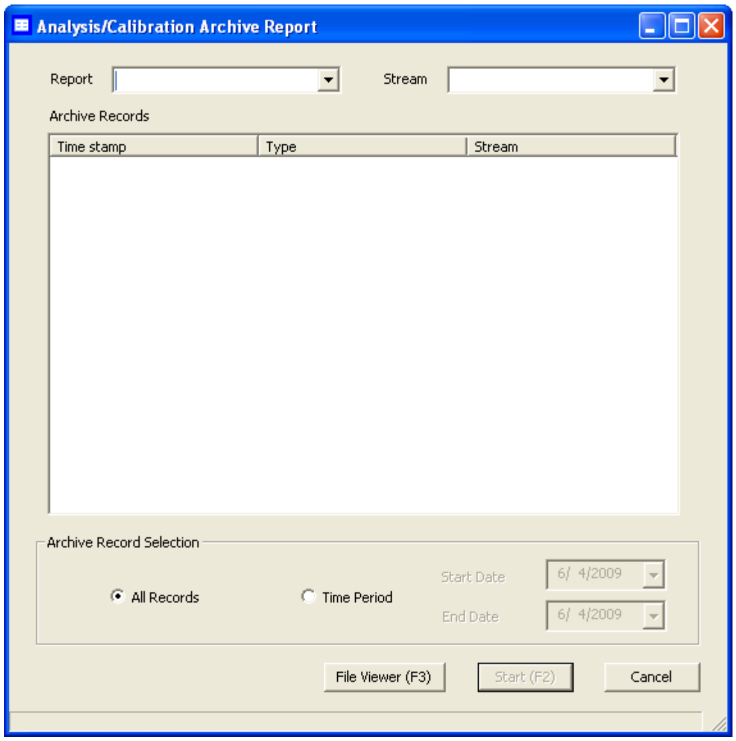
Use the Archive Report commands to generate analysis, calibration, and average reports based on archived GC runs.

5.7.1 Viewing analysis and calibration reports based on archived data

To generate and view an analysis or calibration report from archived data, do the following:

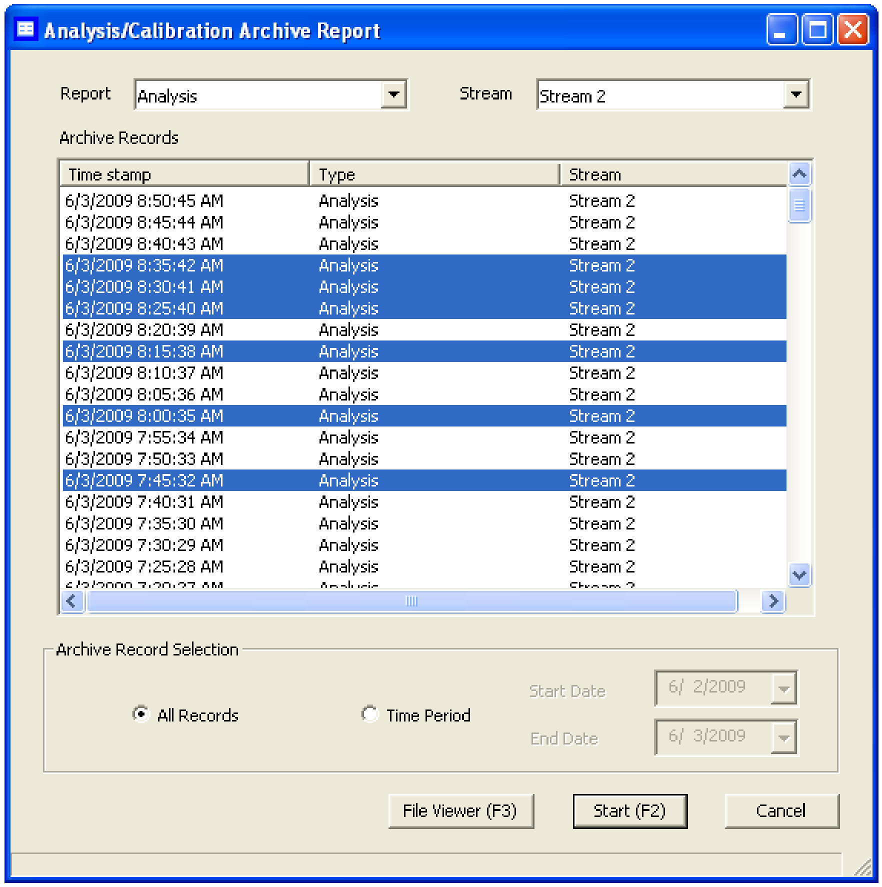
1. Select **Logs/Reports** → **Archive Report** → **Analysis/Calibration/Validation...**. The *Analysis/Calibration/Validation Archive Report* window displays.

Figure 5-27. The Analysis/Calibration Archive Report window



2. Select a report type from the *Report* drop-down list. You can choose from the following report types:
   - Analysis
   - Calibration
   - Final Calibration
   - Validation
   - Final Validation
   - Raw Data
   - Dew Point Calculations (optional)
3. Select a stream from the *Stream* drop-down list. By default, the *Archive Records* table displays all records for the selected report type and stream.

Figure 5-28. The Analysis/Calibration Archive Report window

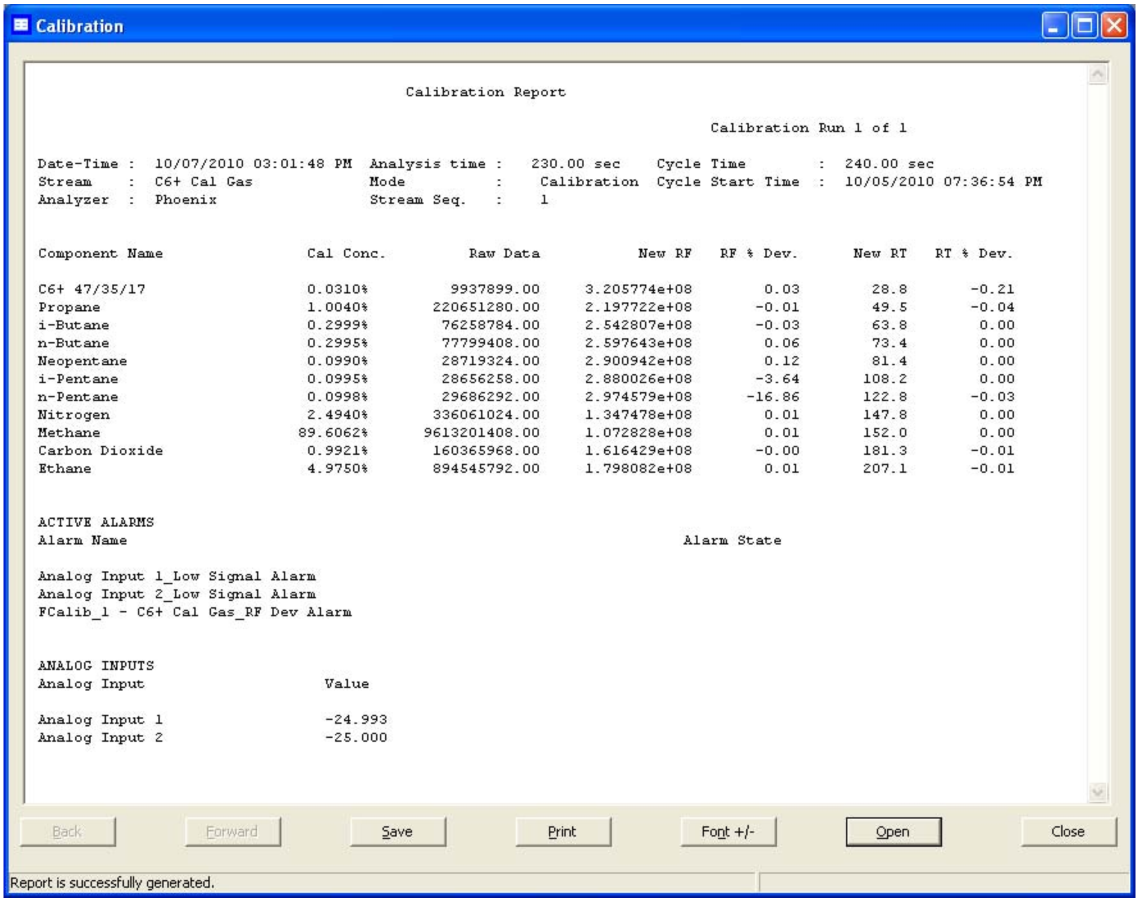


4. To date-filter the list of records, select the *Time Period* checkbox and use the *Start Date* and *End Date* drop-down boxes to select a date range.

5. Select the record(s) that you want to view. To select several records, hold down **CTRL** and select each record. To select several records in a row, select the first record and then hold down **SHIFT** and select the last record in the series.

6. Click **Start (F2)**. The report displays. If more than one record was selected, each report displays after that previous report on the same page.

Figure 5-29. The report window



Calibration

Calibration Report

Calibration Run 1 of 1

Date-Time	: 10/07/2010 03:01:48 PM	Analysis time :	230.00 sec	Cycle Time	: 240.00 sec
Stream	: C6+ Cal Gas	Mode :	Calibration	Cycle Start Time	: 10/05/2010 07:36:54 PM
Analyzer	: Phoenix	Stream Seq. :	1		

Component Name	Cal Conc.	Raw Data	New RF	RF % Dev.	New RT	RT % Dev.
C6+ 47/35/17	0.0310%	9937899.00	3.205774e+08	0.03	28.8	-0.21
Propane	1.0040%	220651280.00	2.197722e+08	-0.01	49.5	-0.04
i-Butane	0.2999%	76258784.00	2.542807e+08	-0.03	63.8	0.00
n-Butane	0.2995%	77799408.00	2.597643e+08	0.06	73.4	0.00
Neopentane	0.0990%	28719324.00	2.900942e+08	0.12	81.4	0.00
i-Pentane	0.0995%	28656258.00	2.880026e+08	-3.64	108.2	0.00
n-Pentane	0.0998%	29686292.00	2.974579e+08	-16.86	122.8	-0.03
Nitrogen	2.4940%	336061024.00	1.347478e+08	0.01	147.8	0.00
Methane	89.6062%	9613201408.00	1.072828e+08	0.01	152.0	0.00
Carbon Dioxide	0.9921%	160365968.00	1.616429e+08	-0.00	181.3	-0.01
Ethane	4.9750%	894545792.00	1.798082e+08	0.01	207.1	-0.01

ACTIVE ALARMS

Alarm Name	Alarm State
Analog Input 1_Low Signal Alarm	
Analog Input 2_Low Signal Alarm	
FCalib_1 - C6+ Cal Gas_RF Dev Alarm	

ANALOG INPUTS

Analog Input	Value
Analog Input 1	-24.993
Analog Input 2	-25.000

7. To change the font size, click **Font**.. There are five preset font sizes available. Continue to click **Font** to cycle through the sizes until you are satisfied with the report's readability.
8. To print the report, click **Print**.

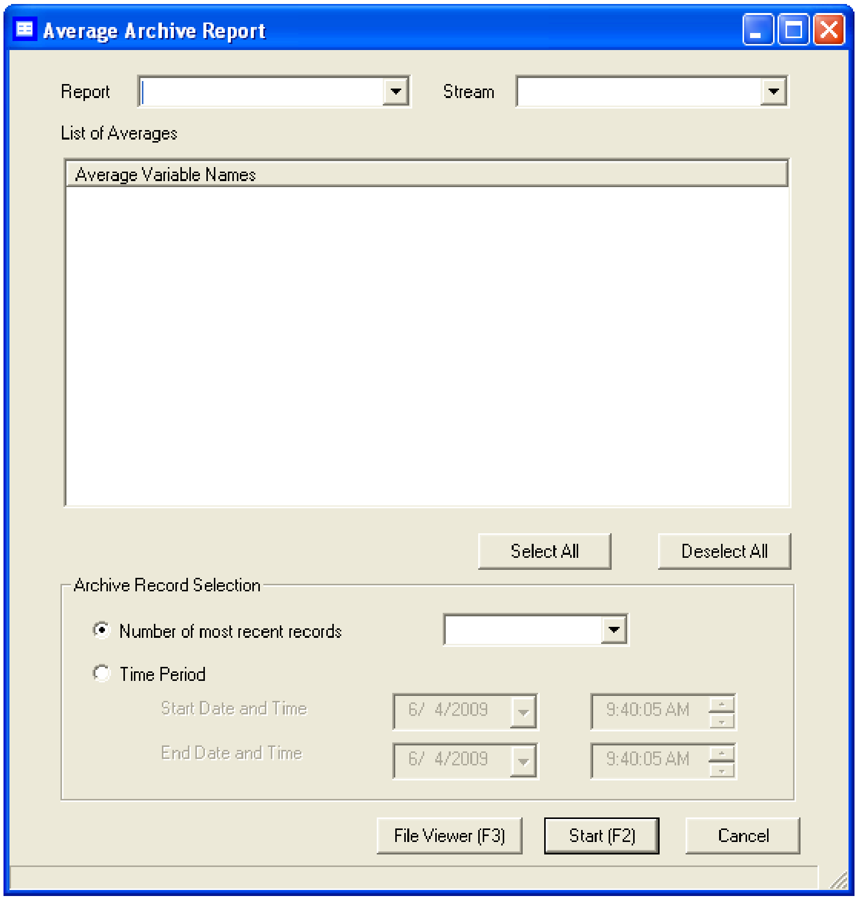
9. To save the file, click **Save**. The report can be saved in the following file formats:
   - TXT
   - HTM
   - HTML
   - MHT

5.7.2 Viewing average reports based on archived data

To generate and view an average report from archived data, do the following:

1. Select **Logs/Reports** → **Archive Report** → **Average...**. The *Average Archive Report* window displays.

Figure 5-30. The Analysis/Calibration Archive Report window



2. Select a report type from the *Report* drop-down list. You can choose from the following report types:
   - Every Run
   - Hourly
   - 24 Hour
   - Weekly
   - Monthly
   - Variable

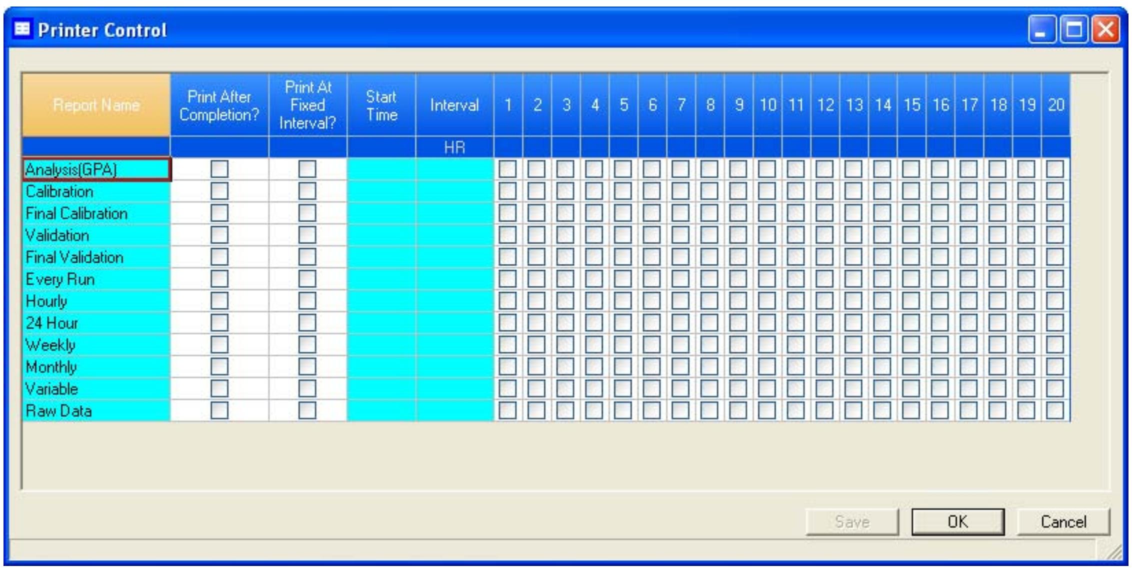
3. Select a stream from the *Stream* drop-down list. By default, the *List of Averages* table displays all records for the selected report type and stream.
4. To date-filter the list of records, select the *Time Period* checkbox and use the *Start Date* and *End Date* drop-down boxes to select a date range.
5. Select the record(s) that you want to view. To select several records, hold down **CTRL** and select each record. To select several records in a row, select the first record and then hold down **SHIFT** and select the last record in the series.
6. Click **Start (F2)**. The report displays. If more than one record was selected, each report displays after that previous report on the same page.
7. To change the font size, click **Font**.. There are five preset font sizes available. Continue to click **Font** to cycle through the sizes until you are satisfied with the report's readability.
8. To print the report, click **Print**.
9. To save the file, click **Save**. The report can be saved in the following file formats:
   - TXT
   - HTM
   - HTML
   - MHT

5.7.3 Printing reports automatically

To configure MON 20/20 to print a report of your choosing automatically based on that report's schedule of availability, do the following:

1. Select **Printer Control...** from the **Logs/Reports** menu. The *Printer Control* window displays.

Figure 5-31. The Printer Control window



Note
MON 20/20 must be connected to the GC for the report to be printed.

2. The following types of potential reports are listed in the *Report Name* column:
   - **Analysis (GPA)** - An analysis report will print after an analysis run is completed.

Note

If **ISO** is set in the *Calculations Configuration* screen, Analysis (ISO) will be listed under the *Report Name* column instead of Analysis (GPA); if **GPA & ISO** is set in the *Calculations Configuration* screen, the both Analysis (ISO) and Analysis (GPA) will be listed under the *Report Name* column.

   - **Calibration** - An calibration report will print after an calibration run is completed.
   - **Final Calibration** - An final calibration report will print after a final calibration run is completed.
   - **Validation** - An validation report will print after an validation run is completed.
   - **Final Validation** - An final validation report will print after a final validation run is completed.
   - **Every Run** - A report will be generated each time an Every Run average calculation is run.
   - **Hourly**: A report will be generated each time an Hourly average calculation is run.
   - **24 Hour**: A report will be generated each time a 24 Hour average calculation is run.
   - **Weekly**: A report will be generated each time a Weekly average calculation is run.
   - **Monthly**: A report will be generated each time a Monthly average calculation is run.
   - **Variable**: A report will be generated each time a Variable average calculation is run.
   - **Raw Data** - Each time raw data is generated, a report will be printed.
3. To print a report after a run, check the appropriate checkbox from the *Print After Completion?* column.

4. To print a report at a fixed interval, check the appropriate checkbox from the *Print At Fixed Interval?* column.

   (a.) Enter a start time in the *Start Time* column.

   (b.) Enter an interval, in hours, in the *Interval* column.

5. Use the columns numbered 1 through 20 to select the streams that you want to use for data collection.

6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

5.8 Viewing trend data

This function allows you to view, print, or save graphical representations, or trend lines, of accumulated analysis data from the GC.

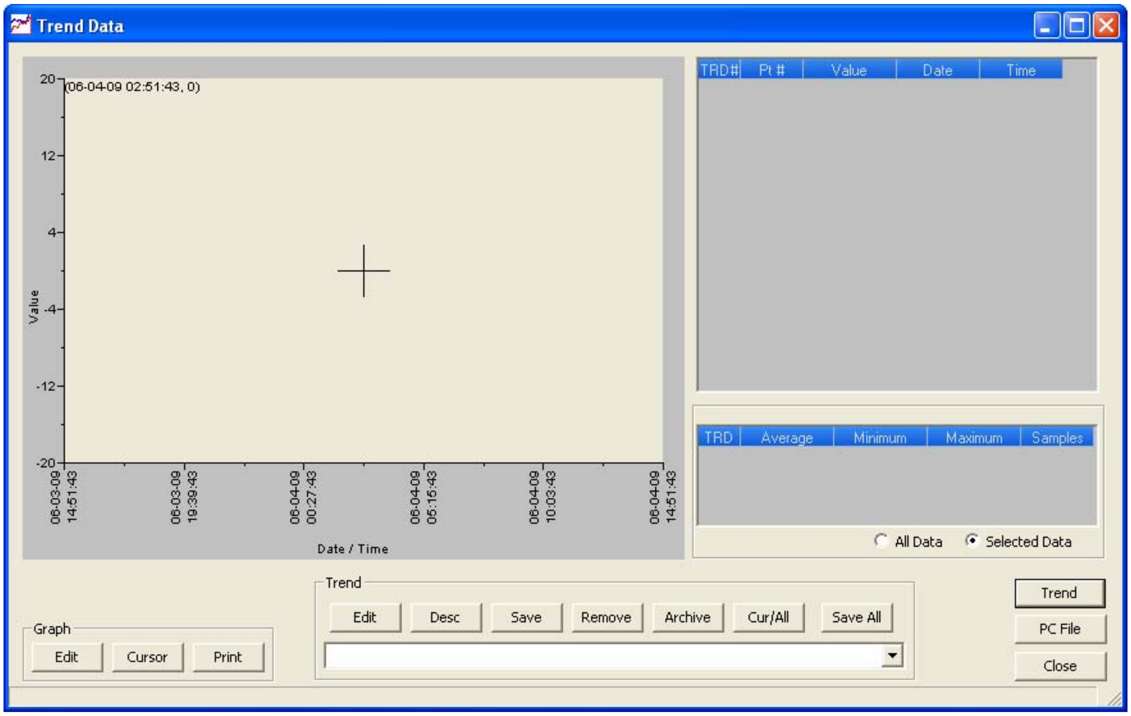
5.8.1 Viewing live trend data

Note
You cannot view a live trend if the corresponding analysis record does not exist in the GC's memory.

To view live trend data, do the following:

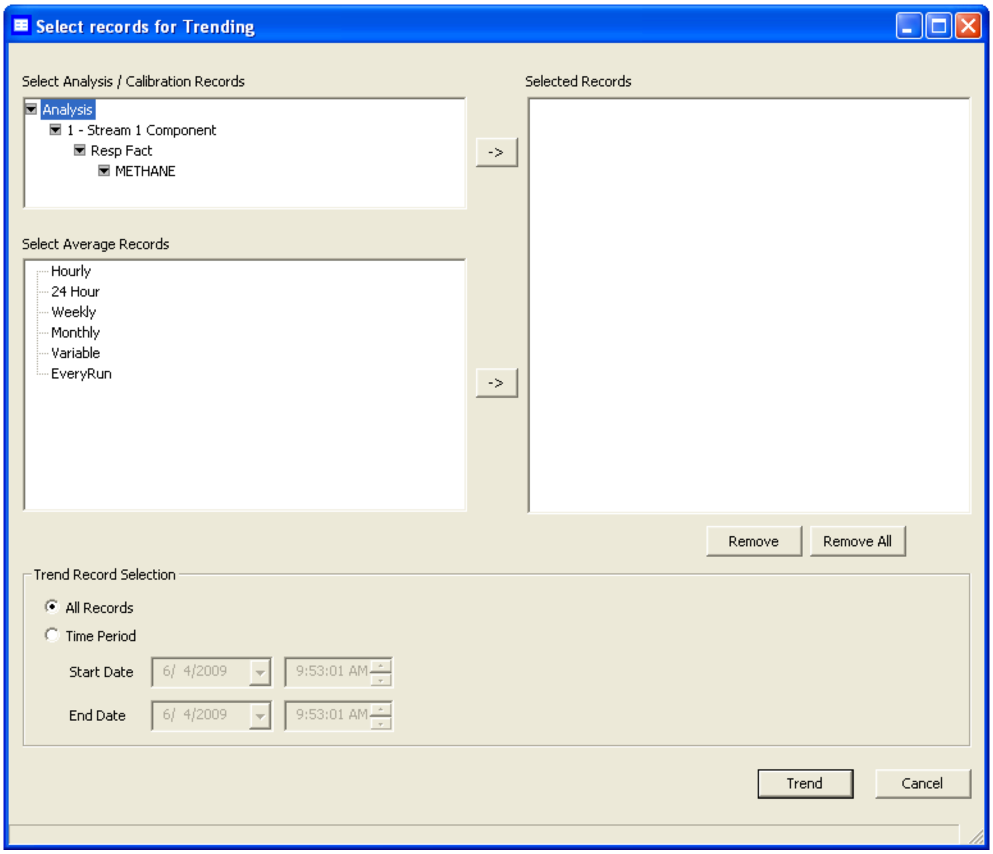
1. Select **Trend Data...** from the **Logs/Reports** menu. The *Trend Data* window displays.

Figure 5-32. The Trend Data window



2. Click **Trend**. The *Select records for Trending* window displays.

Figure 5-33. The Select records for Trending window



3. Select the analysis or calibration records that you want to trend from the *Select Analysis/Calibration Records* selection menu. Click **>** to move your selection to the **Selected Records** queue.

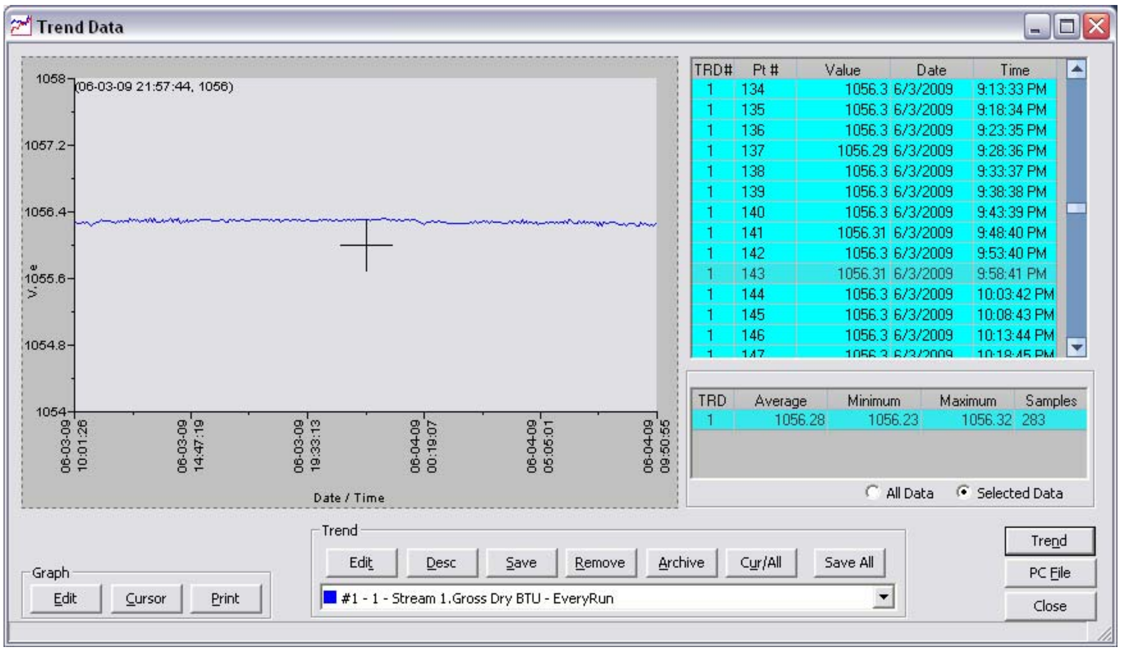
4. If applicable, select the type of average record that you want to trend from the **Select Average Records** section. Click **>** to move your selection to the **Selected Records** queue.

5. To remove a selection from the **Selected Records** queue, click **Remove**. To remove all selections from the **Selected Records** queue, click **Remove All**.

6. Click the *All Records* checkbox from the **Trend Record Selection** section to use all data for the trend report, or click the *Time Period* checkbox and select a *Start Date* and *End Date* for the data to be used.

7. Click **Trend**. MON 20/20 reads the data from the GC and then closes the *Select records for Trending* window and plots the trend data on the graph section of the *Trend Data* window.

Figure 5-34. The Trend Data window with graphs



Each trend record is color-coded; use the *Trend* pull-down menu to select a specific trend record.

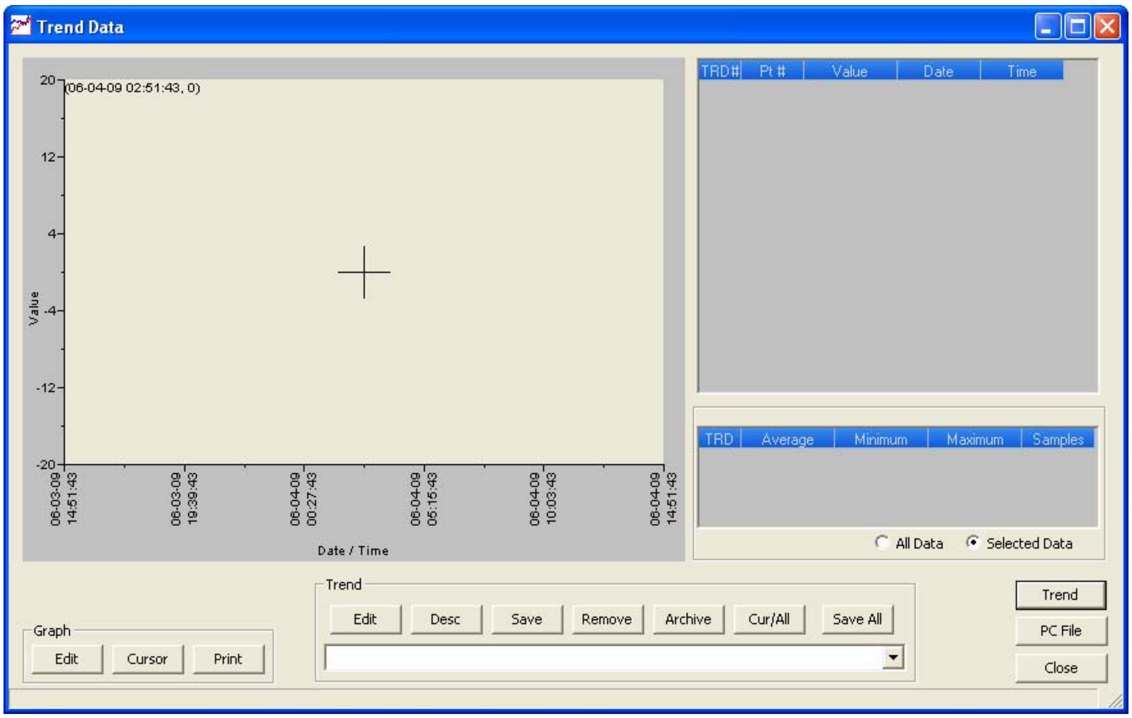
Note
To view the chromatogram that is associated with a particular trend data point, locate the data point in the table and double-click it while pressing the SHIFT key.

5.8.2 Viewing saved trend data

Trend data files are saved with the XTRD file extension. To view a saved trend file, do the following:

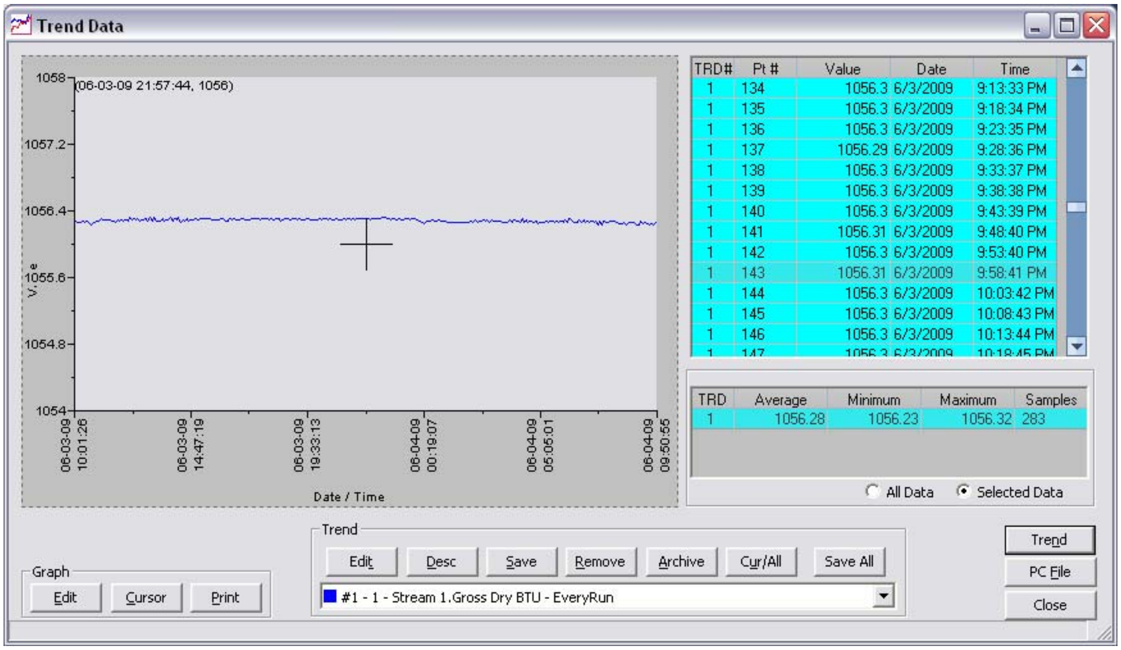
1. Select **Trend Data...** from the **Logs/Reports** menu. The *Trend Data* window displays.

Figure 5-35. The Trend Data window



2. Click **PC File**. The *Open Trend File* window displays.
3. Select the file that you want to view and click **Open**. The trend graph displays.

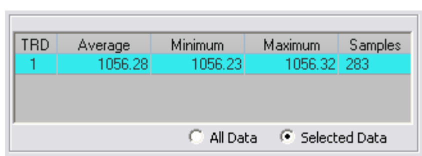
Figure 5-36. The Trend Data window



Note
To view the chromatogram that is associated with a particular trend data point, locate the data point in the table and double-click it while pressing the SHIFT key.

5.9 Working with the Trend Graph

Right-clicking with the mouse on the graph brings up the following commands and keyboard shortcuts:

Command Name	Shortcut	Description
Zoom In	"+" (NUMPAD)	Zooms in on the entire graph. **NOTE**: Another way to zoom in is by clicking and dragging your mouse to select the region of the graph that you want to zoom in on.
Zoom Out	"-" (NUMPAD)	Zooms out from the entire graph.
Zoom X In	"6" (NUMPAD)	Zooms in on the X axis.
Zoom X Out	"4" (NUMPAD)	Zooms out from the X axis.
Zoom Y In	"8" (NUMPAD)	Zooms in on the Y axis.
Zoom Y Out	"2" (NUMPAD)	Zooms out from the Y axis. **NOTE**: When the **Selected Data** checkbox is selected, the small table to the right of the graph displays the trend data for the visible area of the graph when zooming in and out. 
Save State	CTRL + HOME	Saves current or archived display settings for the selected trend graph. **NOTE**: The Save State function is available only when viewing a live or archived trend graph.
Restore State	HOME	Restores the last saved display settings for the selected trend graph. **NOTE**: Pressing **HOME** returns the user to the saved state.
Toggle Full Screen	F11	Maximizes the display of the graph in the Trend Data window.
Cursor to Nearest Point	F8	Snaps the cursor to the nearest point on the trend graph in both the X and Y directions.

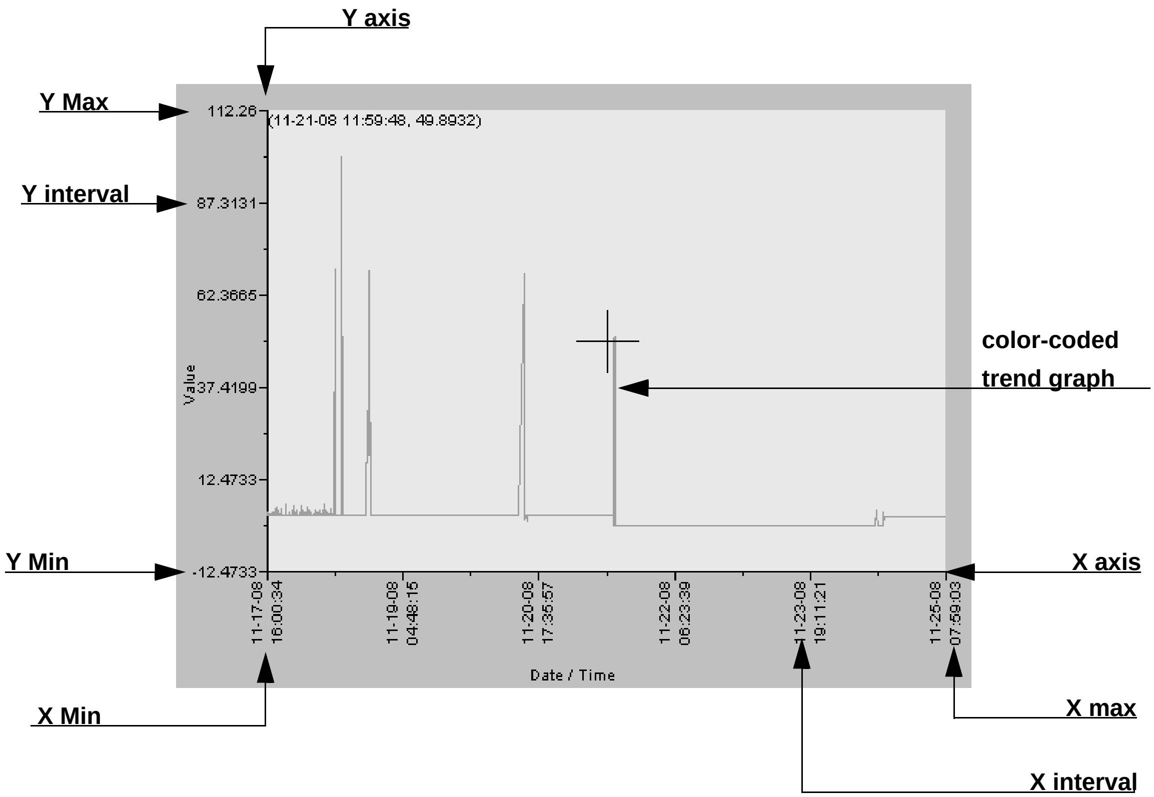
Command Name	Shortcut	Description
Toggle Coarse/Fine Cursor	F4	Toggles the cursor from coarse and less accurate to fine and more accurate.
Toggle Lines/Dots Displays	F9	Toggles the trend graph from lines to dots, or dots to lines.
Toggle Mouse Position Tip	CTRL + F4	The graph's cursor follows the movement of the mouse while a hovering tooltip displays the exact coordinates of the current point.
Toggle Nearest Position Tip	CTRL + F9	The graph's cursor follows the movement of the mouse cursor.
Print	CTRL + P	Prints the trend graph.
Copy to clipboard	CTRL + C	Copies from the graph the raw detector data that was used to plot the selected trend graph. This data can be pasted into another application such as Microsoft Word or Microsoft Excel.
Paste from clipboard	CTRL + V	Plots a range of points copied from another application such as Microsoft Word or Microsoft Excel.

5.10 Editing the display properties of the graph

5.10.1 The graph bar

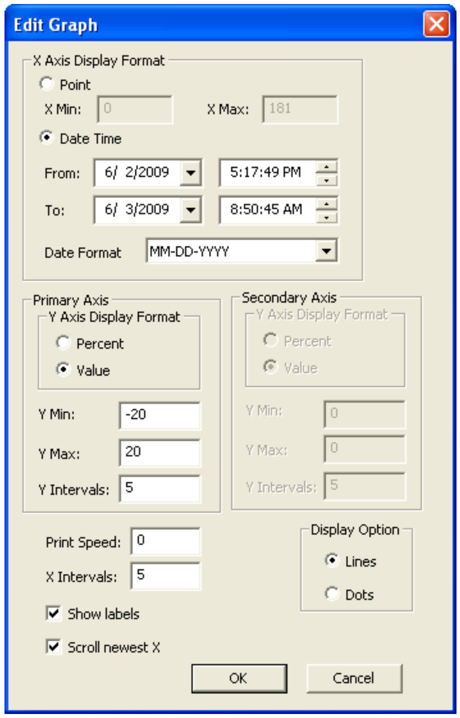
Use the graph bar buttons to change the display parameters of the graph.

Figure 5-37. The graph



Click **Edit** to view or change the display properties of the X and Y axes. The *Edit Graph* window displays.

Figure 5-38. The Edit Graph window

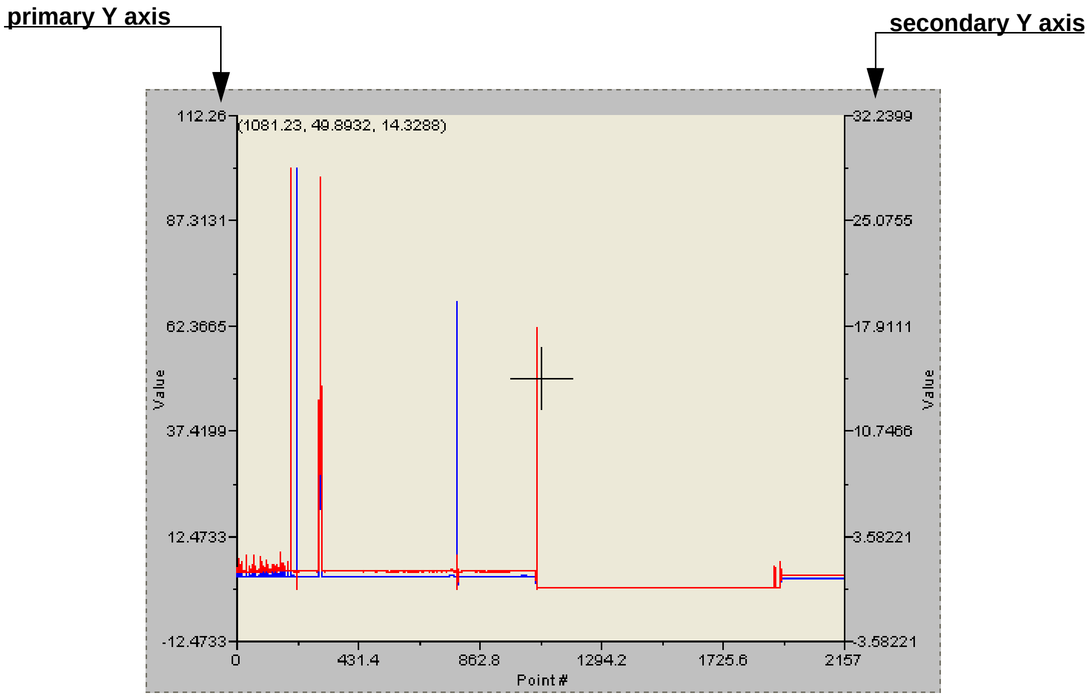


The following table lists the parameters that can be edited:

Command	Description	Default Value
Point	Sets the X-axis values to points. For the purposes of this graph, each sample run is considered a data point. Therefore, if 2500 sample runs were used to generate the trend graph, then there are 2500 data points. **NOTE**: The X-axis value for the first sample, or point, in the trend graph is **0**, not 1. The X-axis value for the final point in the trend graph is N - 1, where N is the total number of points in the graph. • **X Min** - Sets the minimum value for the X axis to the point number of the first sample you want to use in the plot. Default value is **0**. • **X Max** - Sets the maximum value for the X axis to the point number of the last sample you want to use in the plot. Default value is *N* - 1, where *N* is the total number of points in the graph. Therefore, if there are 2500 points, then the X Max would be 2499.	0
Date Time	Sets the X-axis values to the particular GC dates and times of each sample runs. • **From** - Sets the minimum value for the X axis to the date of the first sample you want to use in the plot. • **To** - Sets the maximum value for the X axis to the date of the last sample you want to use in the plot. • **Date Format** - Options are MM-DD-YYYY or DD-MM-YYYY.	N/A

The primary Y axis is the default axis for displaying trend graphs. The secondary Y axis can be used to display a second graph whose minimum and maximum values are different than the minimum and maximum values of the first graph.

Figure 5-39. Primary axes



Note
If three or more graphs are displayed, only the second graph will be plotted using the secondary Y axis; all other graphs will be plotted with the primary Y axis.

Command	Description	Default Value
Y axis Display Format	• Percent - Sets the Y-axis values to a percentage of the **Y Max** value. • Value - Sets the Y-axis values to the sample run values.	0
Y Min	Sets the minimum value for the Y axis.	N/A
Y Max	Sets the maximum value for the Y axis.	N/A
Y Intervals	Sets the number of intervals to be displayed on the graph for the Y axis.	N/A

Command	Description	Default Value
Print Speed	Sets the number of inches per second for the x-axis while printing a chromatogram, similar to an XY plotter.	N/A
X Intervals	Sets the number of intervals to be displayed on the graph for the X axis.	10
Display Option	Determines whether the chromatograph is displayed as a solid line or as a dotted line.	Lines
Show labels	Determines whether each axis is labelled.	Checked
Scroll newest X	Determined whether the graph's window moves to focus on the most recent data point along the x axis.	Checked

To accept your changes, click **OK**.

Click **Cursor** to toggle the cursor size from coarse movement (less accurate) to fine movement (more accurate).

Click **Print** to print the graph window.

5.11 Working with a trend graph

Figure 5-40. The Trend bar

The Trend bar contains a row of buttons that allows you to manipulate a single trend trace. Below the row of buttons is the trace pull-down menu, which contains a list of all of the currently displayed traces that make up the trend graph. Before you can work with a trend trace you must first select it from the pull-down menu.

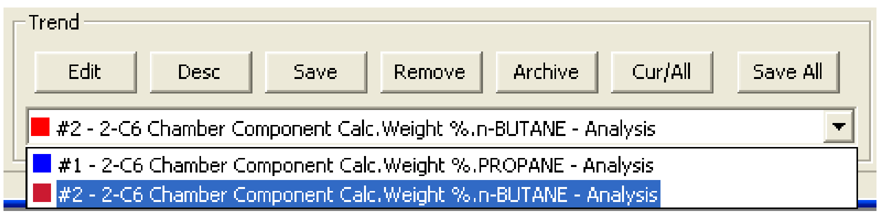
5.11.1 Editing a trend graph

You can use the **Edit** window to change the X and Y offset values for a graph, change its color, and also set which Y axis should be used when plotting it. These changes may be necessary to make the trend more distinguishable from those that surround it, or to position a graph in relation to a different graph for comparison.

To edit a trend trace, do the following:

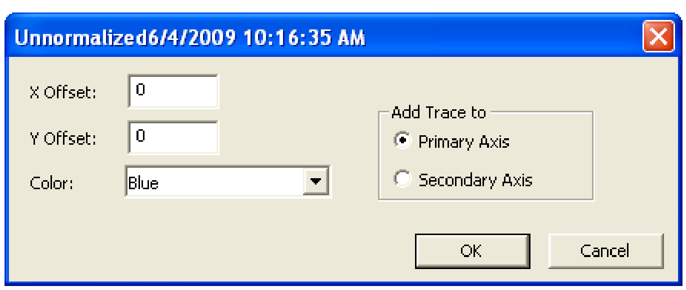
1. From the Trend pull-down menu, select the graph that you want to edit.

Figure 5-41. The Trend pull-down menu



2. Click **Edit**. The *Edit Trend* dialog displays.

Figure 5-42. The Edit Trend dialog



- **X Offset** - Enter a positive number to move the trend to the right, or a negative number to move the trend to the left.
- **Y Offset** - Enter a positive number to move the trend up, or a negative number to move the trend down.
- **Color** - Assigns a color to the trend.

- **Add Trace to** - Sets which Y axis should be used when plotting the graph. See "The graph bar" on page 5-54 for more information.

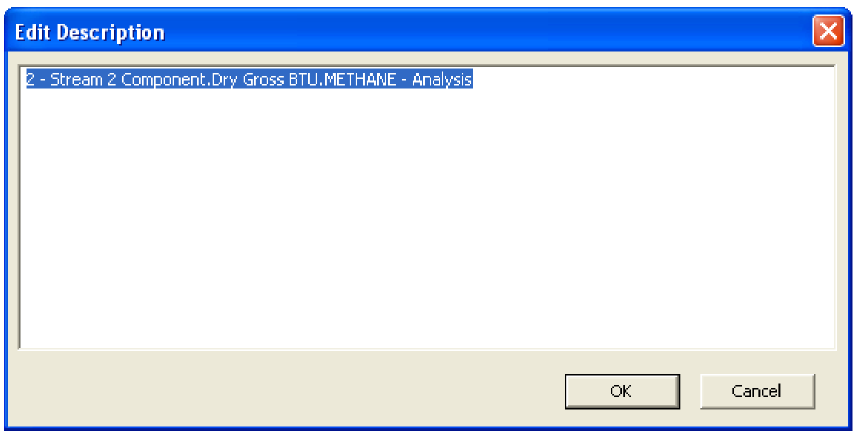
3. To accept your changes, click **OK**.

5.11.2 Entering a description for a trend graph

To add or change description text for a trend graph, do the following:

1. From the **Trend** bar, click **Desc**. The *Edit Description* window displays.

Figure 5-43. The Edit Description window



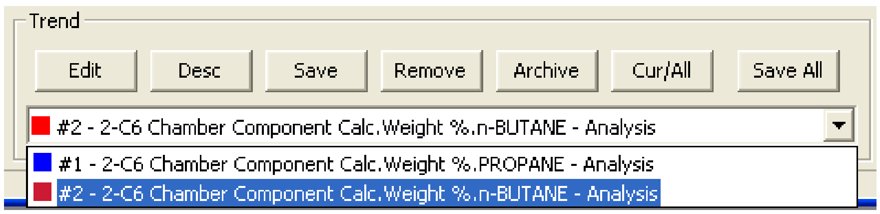
2. Type or edit a description and then close the window.

5.11.3 Saving a trend trace

To save a trend trace to disk, do the following:

1. From the *Trend* pull-down menu, select the trace that you want to save.The Trend pull-down menu.

Figure 5-44. The Trend pull-down menu



2. Click **Save**. The *Save Trend File* window displays.

Note
To save all currently displayed trend traces into one file, click **Save All**.

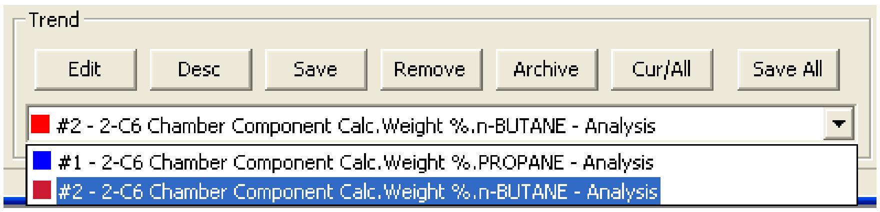
3. For convenience the file is given an auto-generated file name that includes the current date and time; however, you can give the file any name that you choose. Click **Save**.

5.11.4 Removing a trend graph from view

To remove a trend graph from the graph display, do the following:

1. From the *Trend* pull-down menu, select the graph that you want to remove.

Figure 5-45. The Trend pull-down menu

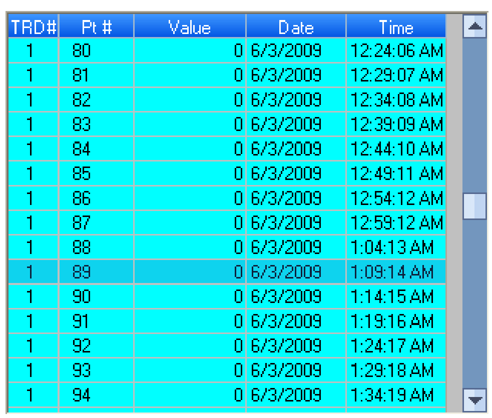


2. Click **Remove**.

5.11.5 Displaying trend data

The data used to plot the trend graphs displays in the table to the right of the graph display area.

Figure 5-46. Trend data



TRD#	Pt #	Value	Date	Time
1	80	0	6/3/2009	12:24:06 AM
1	81	0	6/3/2009	12:29:07 AM
1	82	0	6/3/2009	12:34:08 AM
1	83	0	6/3/2009	12:39:09 AM
1	84	0	6/3/2009	12:44:10 AM
1	85	0	6/3/2009	12:49:11 AM
1	86	0	6/3/2009	12:54:12 AM
1	87	0	6/3/2009	12:59:12 AM
1	88	0	6/3/2009	1:04:13 AM
1	89	0	6/3/2009	1:09:14 AM
1	90	0	6/3/2009	1:14:15 AM
1	91	0	6/3/2009	1:19:16 AM
1	92	0	6/3/2009	1:24:17 AM
1	93	0	6/3/2009	1:29:18 AM
1	94	0	6/3/2009	1:34:19 AM

The table contains the following columns:

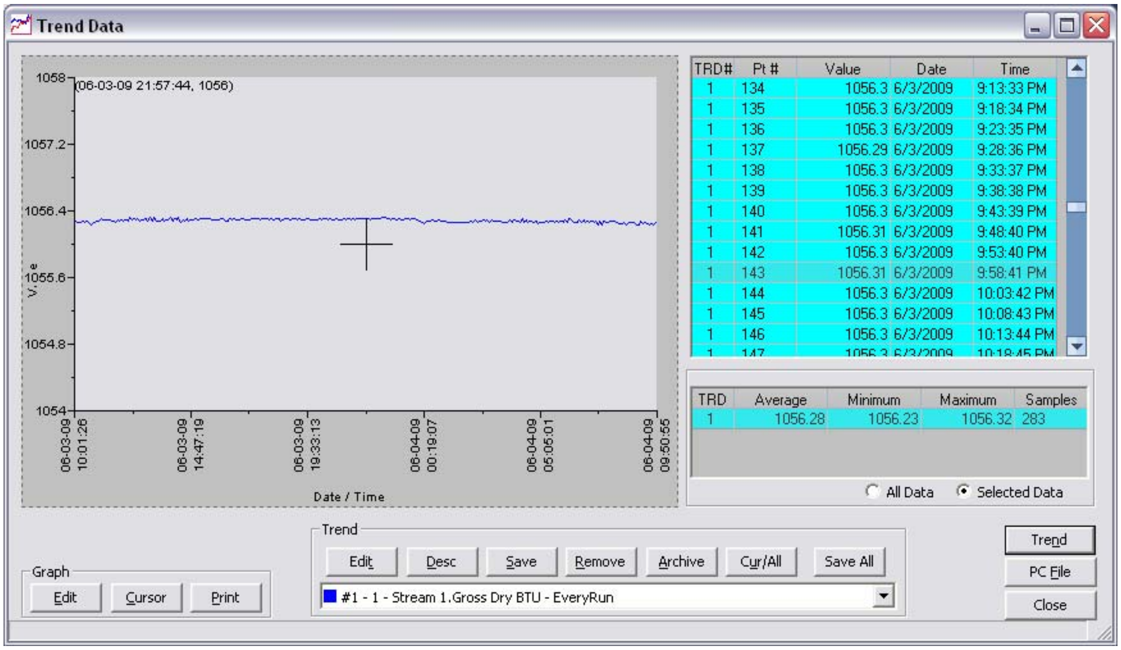
Label	Description
TRD	Indicates the identifcation number of the trend graph.
Pt #	For the purposes of trend graphs, each sample run is considered a data point. Therefore, if 2500 sample runs were used to generate the trend graph, then there are 2500 data points. **NOTE**: The first sample, or point, is counted as 0, not 1. The final point is counted as *N* - 1, where *N* is the total number of points in the graph.
Value	The data point's value.
Data	The GC's date when the sample was run and the value was calculated.
Time	The GC's time when the sample was run and the value was calculated.

Note
To view the chromatogram that is associated with a particular trend data point, locate the data point in the table and double-click it while pressing the SHIFT key.

To view all trend data, click **Cur/All**. To view trend data for the trend graph selected from the Trend drop-down list, click **Cur/All** again.

The second trend data table is useful when zooming in to or out of the graph. When the *Selected Data* checkbox is selected, this table displays the trend data for the visible area of the graph. As the example shows, the table indicates that the trend data for five samples are visible after zooming in to the graph.

Figure 5-47. The Trend Data window



The table contains the following columns:

Label	Description
TRD	Indicates the identifcation number of the trend graph.
Average	Indicates the average data point value of the selected samples.
Minimum	Inidicates the lowest data point value of the selected samples.
Maximum	Inidicates the highest data point value of the selected samples.
Samples	Inidicates the number of samples that were selected and that are displayed in the graph window.

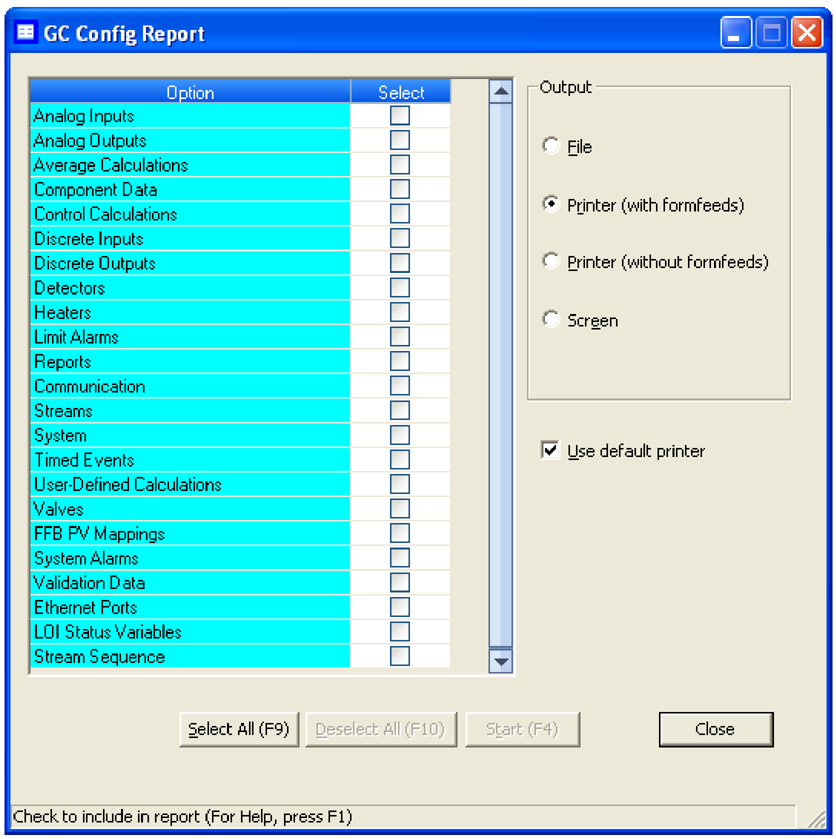
5.12 Generating a GC Configuration Report

A GC Config Report displays all current settings for the GC. This section explains how to produce a GC Config Report and provides an example for reference.

To generate a GC Config Report, do the following:

1. Select **GC Config Report...** from the **Logs/Reports** menu. The *GC Config Report* window displays.

Figure 5-48. The GC Config Report window



2. Select the checkbox for each option that you want to include in the report.

Note

To select all the options, click Select All (F2). To clear all options, click Clear All (F3).

---

3. Select the type of output you want for the report.

Note

When choosing a Printer option, if you want to use a printer different from the one that you usually use, deselect the *Use default printer* checkbox and when the report is ready, the printer configuration window will display.

Note

When choosing the File option, the *Save* window will display, allowing you to name the text file and choose a location in which to save it.

---

4. Click **Start (F4)**. MON 20/20 will generate the customized report and print or save it, according to the output option you selected.

Note

A GC Config Report that includes all options can take several minutes to generate and save. Printing a full report can take longer. If you press ESC, MON 20/20 will stop after the current option is completed.

```
System Report from Model  Austin                  [SAMPLE]
03/12/2009 12:51:58 PM

Description                   Value

Stream Sequence               1,2,3
Analyzer Name                 Austin
GC Model                      GC700XA
System Description
Firmware Version
GC Serial Number
Company Name
GC Location
Number of Valves              3
Number of Serial Ports        3
Daylight Saving Time
CGM Analog O/P Cfg.           0
Baseline Offset
Archive Days                  0
****************************************

Component Data Table Report from Model  Austin
03/12/2009 12:51:59 PM

Component Data Table #1

Component                 U/S  Det #   Retention        Response   Calibration Con
                                       Time (sec)         Factor

C6+ 47/35/17         Standard    1         38.00          891250           0.0000%
PROPANE              Standard    1         50.16    4.655095e+07           0.9995%
i-BUTANE             Standard    1         63.12    5.513906e+07           0.3000%
n-BUTANE             Standard    1         70.88    5.610726e+07           0.3000%
NEOPENTANE           Standard    1          0.00               0           0.0000%
i-PENTANE            Standard    1        101.92    6.363212e+07           0.1000%
n-PENTANE            Standard    1        113.84    6.487665e+07           0.1000%
NITROGEN             Standard    1        141.68    3.865339e+07           2.4990%
METHANE              Standard    1        145.80    2.679253e+07          89.5920%
CARBON DIOXIDE       Standard    1        178.68    3.795704e+07           0.9997%
ETHANE               Standard    1        206.20    4.166654e+07           5.0000%
n-NONANE             Standard    2         34.80    9.057038e+08           0.0100%
n-HEXANE             Standard    2        105.00    5.647477e+08           0.0598%
n-HEPTANE            Standard    2        148.08      7.3743e+08           0.0200%
n-OCTANE             Standard    2        255.96    7.554687e+08           0.0201%



Component               Analysis  RT Dev.  RT Dev.  Update  Gross BTU  Net Dry BTU
                          Method    (sec)      (%)  Method

C6+ 47/35/17               Fixed        3     0.00     Cal  5288.7002    4900.6001
PROPANE                     Area        3     5.00     Cal  2522.0000    2320.3999
i-BUTANE                    Area        3     5.00     Cal  3259.5000    3006.8999
```

SAMPLE cont.

n-BUTANE	Area	3	5.00	Cal	3269.8999	3018.0000
NEOPENTANE	Fixed	3	5.00	Cal	3993.8999	3691.3999
i-PENTANE	Area	3	5.00	Cal	4010.2000	3707.6001
n-PENTANE	Area	3	5.00	Cal	4018.0000	3715.6001
NITROGEN	Area	3	5.00	Cal	0.0000	0.0000
METHANE	Area	3	5.00	Cal	1012.3000	911.1000
CARBON DIOXIDE	Area	4	5.00	Cal	0.0000	0.0000
ETHANE	Area	5	5.00	Cal	1773.8000	1622.8000
n-NONANE	Area	3	0.00	Cal	7012.6001	6508.0000
n-HEXANE	Area	3	0.00	Cal	4767.0000	4414.2002
n-HEPTANE	Area	4	0.00	Cal	5515.2002	5111.7998
n-OCTANE	Area	5	0.00	Cal	6263.3999	5809.3999

Component	Molecular Weight	AGA 8 Component	Reid Vapor	Relative Density Gas	Relative Density Lqd
C6+ 47/35/17	95.956	C6mix1	3.020	3.3135	0.6800
PROPANE	44.096	PROPANE	188.690	1.5227	0.5074
i-BUTANE	58.122	i-BUTANE	72.484	2.0071	0.5630
n-BUTANE	58.122	n-BUTANE	51.683	2.0071	0.5841
NEOPENTANE	72.150	i-PENTANE	35.900	2.4911	0.5967
i-PENTANE	72.149	i-PENTANE	20.456	2.4914	0.6246
n-PENTANE	72.149	n-PENTANE	15.558	2.4914	0.6311
NITROGEN	28.013	NITROGEN	0.000	0.9673	0.8069
METHANE	16.042	METHANE	5000.000	0.5540	0.3000
CARBON DIOXIDE	44.010	CO2	0.000	1.5197	0.8220
ETHANE	30.069	ETHANE	800.000	1.0383	0.3564
n-NONANE	128.260	n-NONANE	0.170	4.4289	0.7219
n-HEXANE	86.175	n-HEXANE	4.961	2.9758	0.6640
n-HEPTANE	100.200	n-HEPTANE	1.620	3.4601	0.6882
n-OCTANE	114.230	n-OCTANE	0.537	3.9445	0.7070

Component	HV Sup MJ/m3	HV Inf MJ/m3	HV Sup MJ/kg	HV Inf MJ/kg	Relative Response Factor
C6+ 47/35/17	196.980	182.520	48.558	44.989	0.0
PROPANE	93.936	86.419	50.370	46.340	0.0
i-BUTANE	121.400	112.010	49.389	45.568	0.0
n-BUTANE	121.790	112.400	49.547	45.726	0.0
NEOPENTANE	148.760	137.490	48.750	45.060	0.0
i-PENTANE	149.360	138.090	48.950	45.255	0.0
n-PENTANE	149.660	138.380	49.046	45.350	0.0
NITROGEN	0.000	0.000	0.000	0.000	0.0
METHANE	37.707	33.949	55.576	50.037	0.0
CARBON DIOXIDE	0.000	0.000	0.000	0.000	0.0
ETHANE	66.067	60.429	51.952	47.518	0.0
n-NONANE	261.190	242.400	48.153	44.689	0.0
n-HEXANE	177.550	164.400	48.717	45.108	0.0

SAMPLE cont.

n-HEPTANE	205.420	190.390	48.474	44.927	0.0
n-OCTANE	233.290	216.370	48.289	44.788	0.0

Component	Reference Component	MultiLevel Calib 'a'	MultiLevel Calib 'b'	MultiLevel Calib 'c'	MultiLevel Calib 'd'
C6+ 47/35/17	none				
PROPANE	none				
i-BUTANE	none				
n-BUTANE	none				
NEOPENTANE	none				
i-PENTANE	none				
n-PENTANE	none				
NITROGEN	none				
METHANE	none				
CARBON DIOXIDE	none				
ETHANE	none				
n-NONANE	none				
n-HEXANE	none				
n-HEPTANE	none				
n-OCTANE	none				

Component Data Table #2

Component	U/S	Det #	Retention Time (sec)	Response Factor	Calibration Con
C6+ 47/35/17	Standard	1	26.50	7697800	0.0204
PROPANE	Standard	1	46.90	4322000	0.4995
i-BUTANE	Standard	1	57.40	4993200	0.1012
n-BUTANE	Standard	1	64.30	5085100	0.1007
NEOPENTANE	Standard	1	70.10	5673100	0.0503
i-PENTANE	Standard	1	89.40	5683100	0.0499
n-PENTANE	Standard	1	99.90	5731600	0.0503
NITROGEN	Standard	1	143.40	3080000	0.5984
METHANE	Standard	1	147.00	2362600	97.1310
CARBON DIOXIDE	Standard	1	179.50	3568900	0.3991
ETHANE	Standard	1	208.60	4078100	0.9992
H2S	Standard	1	300.10	0	0.0000

Component	Analysis Method	RT Dev. (sec)	RT Dev. (%)	Update Method	Gross BTU	Net Dry BTU
C6+ 47/35/17	area	0	5.00	Cal	5288.7100	4900.6201
PROPANE	area	0	5.00	Cal	2522.0200	2320.3601
i-BUTANE	area	0	5.00	Cal	3259.5000	3006.8999
n-BUTANE	area	0	5.00	Cal	3269.9500	3017.9700
NEOPENTANE	area	0	5.00	Cal	3993.8999	3691.3999
i-PENTANE	area	0	5.00	Cal	4010.1599	3707.5601

SAMPLE cont.

n-PENTANE	area	0	5.00	Cal	4017.9700	3715.5801
NITROGEN	area	0	5.00	Cal	0.0000	0.0000
METHANE	area	0	5.00	Cal	1012.3400	911.1030
CARBON DIOXIDE	area	0	5.00	Cal	0.0000	0.0000
ETHANE	area	0	5.00	Cal	1773.8000	1622.7500
H2S	area	0	0.00	Cal	638.5800	588.1600

Component	Molecular Weight	AGA 8 Component	Reid Vapor	Relative Density Gas	Relative Density Lqd
C6+ 47/35/17	95.956	C6mix1	3.020	3.3135	0.6800
PROPANE	44.096	PROPANE	188.690	1.5227	0.5074
i-BUTANE	58.122	i-BUTANE	72.484	2.0071	0.5630
n-BUTANE	58.122	n-BUTANE	51.683	2.0071	0.5841
NEOPENTANE	72.150	i-PENTANE	35.900	2.4911	0.5967
i-PENTANE	72.149	i-PENTANE	20.456	2.4914	0.6246
n-PENTANE	72.149	n-PENTANE	15.558	2.4914	0.6311
NITROGEN	28.013	NITROGEN	0.000	0.9673	0.8069
METHANE	16.042	METHANE	5000.000	0.5540	0.3000
CARBON DIOXIDE	44.010	CO2	0.000	1.5197	0.8220
ETHANE	30.069	ETHANE	800.000	1.0383	0.3564
H2S	34.082	H2S	395.550	1.1769	0.8027

Component	HV Sup MJ/m3	HV Inf MJ/m3	HV Sup MJ/kg	HV Inf MJ/kg	Relative Response Factor
C6+ 47/35/17	196.980	182.520	48.558	44.989	0.0
PROPANE	93.936	86.419	50.370	46.340	0.0
i-BUTANE	121.400	112.010	49.389	45.568	0.0
n-BUTANE	121.790	112.400	49.547	45.726	0.0
NEOPENTANE	148.760	137.490	48.750	45.060	0.0
i-PENTANE	149.360	138.090	48.950	45.255	0.0
n-PENTANE	149.660	138.380	49.046	45.350	0.0
NITROGEN	0.000	0.000	0.000	0.000	0.0
METHANE	37.707	33.949	55.576	50.037	0.0
CARBON DIOXIDE	0.000	0.000	0.000	0.000	0.0
ETHANE	66.067	60.429	51.952	47.518	0.0
H2S	23.785	21.910	16.501	15.200	0.0

Component	Reference Component	MultiLevel Calib 'a'	MultiLevel Calib 'b'	MultiLevel Calib 'c'	MultiLevel Calib 'd'
C6+ 47/35/17	none				
PROPANE	none				
i-BUTANE	none				
n-BUTANE	none				

```
                                                          SAMPLE cont.

NEOPENTANE                    none
i-PENTANE                     none
n-PENTANE                     none
NITROGEN                      none
METHANE                       none
CARBON DIOXIDE                none
ETHANE                        none
H2S                           none


Component Data Table #3



Component Data Table #4




*************************************************************************************

Timed Event Table Report from Model  Austin
03/12/2009 12:52:01 PM

Timed Event Table #1 -
Hardware TEV table 1
TEV Type     Valve/ DO #          State       Time
                                             (Sec)

Valve #      SSO_1                   On        0.0
Valve #      SSO_2                   On        1.0
Valve #      DualColumn              On        2.0
Valve #      S/BF_1                  On        5.0
Valve #      S/BF_2                  On        6.0
Strm Sw                                       11.0
Valve #      SSO_1                  Off       15.0
Valve #      SSO_2                  Off       16.0
Valve #      S/BF_1                 Off       26.5
Valve #      S/BF_2                 Off       28.0
Valve #      DualColumn             Off       43.5
Valve #      DualColumn              On      132.5


Software TEV table 1
TEV Type          Value           Det #       Time
                                             (Sec)

Inhibit           On                2          0.0
Inhibit           On                1          0.0
Peak Width        6                 2          0.0
Slope Sens        24                2          0.0
```

SAMPLE cont.

```
Slope Sens      48                 1        3.0
Peak Width      4                  1        4.0
Inhibit         Off                2       31.3
Inhibit         Off                1       33.0
Inhibit         On                 2       38.5
Inhibit         On                 1       43.5
Inhibit         Off                1       48.0
Inhibit         Off                2       72.5
Summation       On                 2       72.6
Inhibit         On                 1       85.0
Inhibit         Off                1       87.0
Summation       Off                2      105.0
Inhibit         On                 1      133.0
Peak Width      2                  1      134.0
Slope Sens      16                 1      134.5
Inhibit         Off                1      137.5
Inhibit         On                 2      170.0
Inhibit         On                 1      170.0
Peak Width      8                  2      170.5
Inhibit         Off                2      171.0
Peak Width      8                  1      171.0
Slope Sens      48                 1      171.5
Inhibit         Off                1      172.0
Inhibit         On                 1      290.0
Inhibit         On                 2      291.0

Gain TEV table 1
Det #    Gain        Time
                    (Sec)

1           4         0.0
2           4         0.0


Timed Event Table #2 -
Hardware TEV table 2
TEV Type     Valve/ DO #          State      Time
                                            (Sec)

Valve #      SSO_1                   On       0.0
Valve #      SSO_2                   On       0.0
Valve #      DualColumn              On       2.0
Valve #      S/BF_1                 Off       5.0
Valve #      S/BF_2                 Off       6.0
Strm Sw                                      11.0
Valve #      S/BF_2                 Off      24.5
Valve #      S/BF_1                 Off      25.5
Valve #      SSO_1                  Off      40.0
Valve #      SSO_2                  Off      40.0
Valve #      DualColumn             Off      45.0
Valve #      DualColumn              On     157.0
```

SAMPLE cont.

Software TEV table 2

TEV Type	Value	Det #	Time (Sec)
Inhibit	On	1	0.0
Inhibit	On	2	0.0
Peak Width	2	1	0.0
Peak Width	2	2	0.0
Inhibit	Off	1	0.1
Inhibit	Off	2	0.1
Inhibit	On	1	285.0
Inhibit	On	2	285.0

Gain TEV table 2

Det #	Gain	Time (Sec)
1	12	0.0
2	12	0.0

Timed Event Table #3 -
Hardware TEV table 3

TEV Type	Valve/ DO #	State	Time (Sec)
Valve #	SSO_1	On	0.0
Valve #	SSO_2	On	1.0
Valve #	DualColumn	On	2.0
Valve #	S/BF_1	On	5.0
Valve #	S/BF_2	On	6.0
Strm Sw			11.0
Valve #	SSO_1	On	15.0
Valve #	SSO_2	On	16.0
Valve #	S/BF_1	On	26.5
Valve #	S/BF_2	On	28.0
Valve #	DualColumn	Off	42.5
Valve #	DualColumn	On	133.0

Software TEV table 3

TEV Type	Value	Det #	Time (Sec)
Inhibit	On	1	0.0
Inhibit	On	2	0.0
Slope Sens	48	1	3.0
Peak Width	2	1	3.5
Slope Sens	48	2	4.0
Peak Width	2	2	4.5

SAMPLE cont.

```
Inhibit          Off               1         5.0
Inhibit          Off               2         5.5
Inhibit          On                1        13.0
Inhibit          On                2        13.5
Inhibit          Off               1        25.0
Inhibit          On                1        27.0
Inhibit          Off               1        28.0
Inhibit          Off               2        28.3
Inhibit          On                2        31.5
Inhibit          On                1        34.0
Inhibit          On                1        45.0
Inhibit          On                1        48.0
Inhibit          Off               1       133.2
Inhibit          On                1       141.5

Gain TEV table 3
Det #    Gain        Time
                    (Sec)

1           4         0.0
2           4         0.0

Timed Event Table #4 -
Hardware TEV table 4
Software TEV table 4
Gain TEV table 4
*************************************************

Calculation Control Report from Model  Austin
03/12/2009 12:52:02 PM

Description                  1   2   3   4   5   6   7   8
Average Limit Alarm Test     N   Y   N   N   N   N   N   N
Mole Percent                 Y   Y   N   N   Y   Y   Y   Y
Liquid Volume                Y   Y   N   N   N   N   N   N
Weight Percent               Y   Y   N   N   N   N   N   N
Normalize Results            N   Y   N   N   Y   Y   Y   Y
Gas Density                  N   N   N   N   N   N   N   N
Real Rel Den Gas Prim        Y   Y   N   N   N   N   N   N
Wobbe Index Sup Sec          Y   Y   N   N   N   N   N   N
Z Fact Prim                  Y   Y   N   N   N   N   N   N
Dry Gross Heating            Y   Y   N   N   N   N   N   N
Sat Gross Heating            Y   Y   N   N   N   N   N   N
Wobbe Index Sup Prim         Y   Y   N   N   N   N   N   N
Wobbe Index Inf Sec          Y   Y   N   N   N   N   N   N
Gallons/1000 SCF C2+         Y   Y   N   N   N   N   N   N
Gallons/1000 SCF C3+         Y   Y   N   N   N   N   N   N
Gallons/1000 SCF C4+         Y   Y   N   N   N   N   N   N
Gallons/1000 SCF C5+         Y   Y   N   N   N   N   N   N
Gallons/1000 SCF C6+         Y   Y   N   N   N   N   N   N
Avg Mol Wt                   Y   Y   N   N   N   N   N   N
```

SAMPLE cont.

```
Sup Calorific Val Dry Prim   N   N   N   N   N   N   N   N
Sup Calorific Val Sat Prim   N   N   N   N   N   N   N   N
Inf Calorific Val Dry Prim   N   N   N   N   N   N   N   N
Inf Calorific Val Sat Prim   N   N   N   N   N   N   N   N
Sup Calorific Val Dry Sec    N   N   N   N   N   N   N   N
Sup Calorific Val Sat Sec    N   N   N   N   N   N   N   N
Inf Calorific Val Dry Sec    N   N   N   N   N   N   N   N
Inf Calorific Val Sat Sec    N   N   N   N   N   N   N   N
Wobbe Index Inf Prim         N   N   N   N   N   N   N   N
Real Rel Den Gas Sec         N   N   N   N   N   N   N   N
Gas Den Kg/m3                N   N   N   N   N   N   N   N
**********************************************************

Calculation Average Report from Model  Austin
03/12/2009 12:52:02 PM


Average Label    Variable Name

Average 001      1-C9 Cal Gas.Gross Dry BTU
Average 002      Heaters.Temperature.Heater 1
Average 003      Heaters.Temperature.Heater 2
Average 004      Heaters.Temperature.Heater 3
Average 005      1-C9 Cal Gas Component.Peak Area.METHANE
Average 006      1-C9 Cal Gas Component.Peak Height.METHANE



Average Label    Average Type    Hours    Restart Time    Weekday    Day
                                               (hh:mm)

Average 001      Everyrun
Average 002      Everyrun
Average 003      Everyrun
Average 004      Everyrun
Average 005      Everyrun
Average 006      Everyrun


****************************************************************************

Calculation User-Defined Report from Model  Austin
03/12/2009 12:52:03 PM

Label                Comment

User Cal 01
```

```
                                                              SAMPLE cont.

Label                Cal Freq.                    Start Time     Interval
                                         (mm-dd-yyyy hh:mm:ss)      (sec)

User Cal 01          User Defined          01-01-1970 00:00:00          5


*************************************************************************

Limit Alarms Report from Model  Austin
03/12/2009 12:52:04 PM

System Alarm Table -

Label           Variable

Alarm 001       Electronic Pressure Control.Status.EPC1
Alarm 002       Electronic Pressure Control.Status.EPC2
Alarm 003       Electronic Pressure Control.Status.EPC3
Alarm 004       Electronic Pressure Control.Status.EPC4
Alarm 005       Electronic Pressure Control.Status.EPC5
Alarm 006       Valves.Status.S/BF_1
Alarm 007       Valves.Status.DualColumn
Alarm 008       Valves.Status.S/BF_2
Alarm 009       Valves.Status.SSO_1
Alarm 010       Valves.Status.SSO_2
Alarm 011       Valves.Status.Stream 1
Alarm 012       Valves.Status.Stream 2
Alarm 013       Valves.Status.Stream 3
Alarm 014       Valves.Status.Stream 4
Alarm 015       Valves.Status.unused 1
Alarm 016       Valves.Status.unused 2
Alarm 017       Valves.Status.unused 3
Alarm 018       Heaters.Status.Heater 1
Alarm 019       Heaters.Status.Heater 2
Alarm 020       Heaters.Status.Heater 3
Alarm 021       Heaters.Status.Heater 4
Alarm 022       Detectors.Status.TCD 1
Alarm 023       Detectors.Status.TCD 2
Alarm 024       Detectors.Scaling Factor.TCD 1
Alarm 025       Detectors.Scaling Factor.TCD 2
Alarm 026       Streams.Status.1-C9 Cal Gas
Alarm 027       Streams.Status.2-C6 Chamber
Alarm 028       Streams.Status.Stream 3
Alarm 029       Streams.Status.Stream 4
Alarm 030       Streams.Status.Stream 5
Alarm 031       Streams.Status.Stream 6
Alarm 032       Streams.Status.Stream 7
Alarm 033       Streams.Status.Stream 8
Alarm 034       GC Status.Status
Alarm 035       GC Status.Warmup Status
Alarm 036       GC Status.Is Last Calibration Run Invalid
```

SAMPLE cont.

Alarm 037	1-C9 Cal Gas Final Calib.RF Dev Alarm
Alarm 038	2-C6 Chamber Final Calib.RF Dev Alarm
Alarm 039	Stream 3 Final Calib.RF Dev Alarm
Alarm 040	Stream 4 Final Calib.RF Dev Alarm
Alarm 041	Stream 5 Final Calib.RF Dev Alarm
Alarm 042	Stream 6 Final Calib.RF Dev Alarm
Alarm 043	Stream 7 Final Calib.RF Dev Alarm
Alarm 044	Stream 8 Final Calib.RF Dev Alarm
Alarm 045	System Status.Is User Calculation Failed

Label	Type	Low Limit	High Limit	DO# to Set
Alarm 001	High		3	
Alarm 002	High		3	
Alarm 003	High		3	
Alarm 004	High		3	
Alarm 005	High		3	
Alarm 006	High		3	
Alarm 007	High		3	
Alarm 008	High		3	
Alarm 009	High		3	
Alarm 010	High		3	
Alarm 011	High		3	
Alarm 012	High		3	
Alarm 013	High		3	
Alarm 014	High		3	
Alarm 015	High		3	
Alarm 016	High		3	
Alarm 017	High		3	
Alarm 018	High		3	
Alarm 019	High		3	
Alarm 020	High		3	
Alarm 021	High		3	
Alarm 022	High		4	
Alarm 023	High		4	
Alarm 024	High		12.19999981	
Alarm 025	High		12.19999981	
Alarm 026	High		1	
Alarm 027	High		1	
Alarm 028	High		1	
Alarm 029	High		1	
Alarm 030	High		1	
Alarm 031	High		1	
Alarm 032	High		1	
Alarm 033	High		1	
Alarm 034	High		1	
Alarm 035	High		1	
Alarm 036	High		2	
Alarm 037	High		1	

SAMPLE cont.

```
Alarm 038            High                                    1
Alarm 039            High                                    1
Alarm 040            High                                    1
Alarm 041            High                                    1
Alarm 042            High                                    1
Alarm 043            High                                    1
Alarm 044            High                                    1
Alarm 045            High                                    1



Label             Inhibit  Inhibit       Inhibit       User Alarm
                    Calcs   Average    Alarm Text             Text

Alarm 001           False     False         False  __MSG_SWITCH__{3:Config Error}{4:Out of
 Control}{5:Internal Error}
Alarm 002           False     False         False  __MSG_SWITCH__{3:Config Error}{4:Out of
 Control}{5:Internal Error}
Alarm 003           False     False         False  __MSG_SWITCH__{3:Config Error}{4:Out of
 Control}{5:Internal Error}
Alarm 004           False     False         False  __MSG_SWITCH__{3:Config Error}{4:Out of
 Control}{5:Internal Error}
Alarm 005           False     False         False  __MSG_SWITCH__{3:Config Error}{4:Out of
 Control}{5:Internal Error}
Alarm 006           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 007           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 008           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 009           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 010           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 011           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 012           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 013           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 014           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
```

SAMPLE cont.

```
Alarm 015           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 016           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 017           False     False         False  __MSG_SWITCH__{3:Intrnl Err}{4:HAL Open
 Failed}{5:HAL Close Failed}{6:HAL Intrnl Err}{7:Protocol Err}{8:Device Intrnl Err}{9:Unkn
own Device}{10:Under/Over Current}{11:Time Out}
Alarm 018           False     False         False  __MSG_SWITCH__{3:Out of Range}{4:Intern
al Error}
Alarm 019           False     False         False  __MSG_SWITCH__{3:Out of Range}{4:Intern
al Error}
Alarm 020           False     False         False  __MSG_SWITCH__{3:Out of Range}{4:Intern
al Error}
Alarm 021           False     False         False  __MSG_SWITCH__{3:Out of Range}{4:Intern
al Error}
Alarm 022           False     False         False   Internal Error
Alarm 023           False     False         False   Internal Error
Alarm 024           False     False         False     Out Of Limit
Alarm 025           False     False         False     Out Of Limit
Alarm 026           False     False         False   Stream Skipped
Alarm 027           False     False         False   Stream Skipped
Alarm 028           False     False         False   Stream Skipped
Alarm 029           False     False         False   Stream Skipped
Alarm 030           False     False         False   Stream Skipped
Alarm 031           False     False         False   Stream Skipped
Alarm 032           False     False         False   Stream Skipped
Alarm 033           False     False         False   Stream Skipped
Alarm 034           False     False         False  __MSG_SWITCH__{1:Stream Sequence Table
Is Empty}{2:Undefined Stream Sequence}{3:Invalid Stream Sequence/Stream Not Configured}{4:
Stream Sequence is empty}{5:Invalid Stream Number}
Alarm 035           False     False         False  __MSG_SWITCH__{0:Success}{1:Failure}
Alarm 036           False     False         False  Missing Peak/Component During Calibration
Alarm 037           False     False         False  Response Factor is Out of Limit
Alarm 038           False     False         False  Response Factor is Out of Limit
Alarm 039           False     False         False  Response Factor is Out of Limit
Alarm 040           False     False         False  Response Factor is Out of Limit
Alarm 041           False     False         False  Response Factor is Out of Limit
Alarm 042           False     False         False  Response Factor is Out of Limit
Alarm 043           False     False         False  Response Factor is Out of Limit
Alarm 044           False     False         False  Response Factor is Out of Limit
Alarm 045           False     False         False  User calculation failed
```

```
                                                            SAMPLE cont.

User Alarm Table -



*****************************************************************************************

Streams Report from Model  Austin
03/12/2009 12:52:06 PM

Name                  Use  Det #    CDT     TEV  Total    Avg           Start Time
                                  Table   Table    Run    Run   (mm-dd-yyyy hh:mm:ss)

1-C9 Cal Gas          Cal    1,2  CDT_1   TEV_1      1      1     01-01-1970 00:00:01
2-C6 Chamber          Cal    1,2  CDT_1   TEV_1      1      1     01-01-1970 00:00:01
Stream 3           Unused      1
Stream 4           Unused      1
Stream 5           Unused      1
Stream 6           Unused      1
Stream 7           Unused      1
Stream 8           Unused      1


                                                             Base Conditions
Name             Interval         Auto        Auto    Base Pressure     Base Temparature
                   (hour)        Calib    Baseline            (PSI)             (Deg. F)

1-C9 Cal Gas            1        False       False            14.73                   60
2-C6 Chamber            1        False       False            14.73                   60


                                          Optional Base Pressures
Name                        Optional Base          Optional Base          Optional Base
                         Pressure 1 (PSI)       Pressure 2 (PSI)       Pressure 3 (PSI)

1-C9 Cal Gas                         0.00                   0.00                   0.00
2-C6 Chamber                         0.00                   0.00                   0.00


****************************************************************************************

Analog Input Report from Model  Austin
03/12/2009 12:52:06 PM

Label                      Zero Scale       Full Scale    Switch  mA/Volts        Fixed
                                                                                  Value

Analog Input 1                      0                1  Variable        mA
Analog Input 2                      0                1  Variable        mA


****************************************************************************************
```

SAMPLE cont.

Analog Output Report from Model Austin
03/12/2009 12:52:07 PM

Label	Variable
Analog Output 1	
Analog Output 2	
Analog Output 3	
Analog Output 4	
Analog Output 5	
Analog Output 6	
Analog Output 7	
Analog Output 8	
Analog Output 9	
Analog Output 10	

Label	Switch	Fixed Value	Zero Scale	Full Scale
Analog Output 1	Variable		0	0
Analog Output 2	Variable		0	0
Analog Output 3	Variable		0	0
Analog Output 4	Variable		0	0
Analog Output 5	Variable		0	0
Analog Output 6	Variable		0	0
Analog Output 7	Variable		0	100
Analog Output 8	Variable		0	100
Analog Output 9	Variable		0	100
Analog Output 10	Variable		0	100

****

Discrete Input Report from Model Austin
03/12/2009 12:52:07 PM

Label	Switch	Invert Polarity
Discrete Input 1	Auto	False
Discrete Input 2	Auto	False
Discrete Input 3	Auto	False
Discrete Input 4	Auto	False
Discrete Input 5	Auto	False
Discrete Input 1	Auto	False
Discrete Input 2	Auto	False
Discrete Input 3	Auto	False
Discrete Input 4	Auto	False
Discrete Input 5	Auto	False
Discrete Input 11	Auto	False
Discrete Input 12	Auto	False
Discrete Input 13	Auto	False

```
                                                                SAMPLE cont.

Discrete Input 14            Auto                 False
Discrete Input 15            Auto                 False


******************************************************


Discrete Output Report from Model  Austin
03/12/2009 12:52:08 PM

Label                 Switch      Invert          Start Time       Duration  Interval
                               Polarity   (mm-dd-yyyy hh:mm:ss)    (hh:mm:ss)    (hour)

Discrete Output 1      Auto       False     01-01-1970 01:23:20      02:02:59         1
Discrete Output 2      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 3      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 4      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 5      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 6      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 7      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 8      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 9      Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 10     Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 11     Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 12     Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 13     Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 14     Auto       False     01-01-1970 00:00:00      00:00:00         1
Discrete Output 15     Auto       False     01-01-1970 00:00:00      00:00:00         1


**************************************************************************************

Valve Report from Model   Austin
03/12/2009 12:52:08 PM

Label                    Switch            Usage  Invert Polarity

S/BF_1                     Auto        analyzr01             False
DualColumn                 Auto        analyzr02             False
S/BF_2                     Auto        analyzr03             False
SSO_1                      Auto        analyzr04             False
SSO_2                      Auto        analyzr05             False
Stream 1                   Auto         stream 1             False
Stream 2                   Auto         stream 2             False
Stream 3                   Auto         stream 3             False
Stream 4                   Auto         stream 4             False
unused 1                    Off           unused             False
unused 2                    Off           unused             False
unused 3                    Off           unused             False


*************************************************************
```

SAMPLE cont.

Serial Port Report from Model Austin
03/12/2009 12:52:09 PM

Label	Physical Name	ModBus ID	Unit System	MAP File
First	PORT C	32	U.S. Customary	UsrMap.txt

Label	Port Type	Port Address	Port Available
First	Slave		Available

Label	Baud Rate	Data Bits	Stop Bit	Parity	HW Flow Ctrl	Timeout (sec)
First	38400	8	1	None	Disable	0

Label	RTS ON Delay (msec)	RTS OFF Delay (msec)	Port Resp Delay (msec)
First	0	0	0

File Name : UsrMap
Date : 8/4/2008
Version : 1.0
Author : daniel
Type : User_Modbus
Comment : Comment

Name	Zero Scale	Full Scale
Range	0.000000	65535.000000
SCALED_FP1	0.000000	100.000000
SCALED_FP2	0.000000	1.000000
SCALED_FP3	0.000000	2.000000
SCALED_FP4	0.000000	5.000000
SCALED_FP5	0.000000	10.000000
SCALED_FP6	0.000000	20.000000
SCALED_FP7	0.000000	30.000000
SCALED_FP8	0.000000	40.000000
SCALED_FP9	0.000000	50.000000
SCALED_FP10	0.000000	60.000000

SAMPLE cont.

```
SCALED_FP11                     0.000000           70.000000
SCALED_FP12                     0.000000           80.000000
SCALED_FP13                     0.000000           90.000000
SCALED_FP14                     0.000000          120.000000
SCALED_FP15                     0.000000          200.000000
SCALED_FP16                     0.000000          300.000000
SCALED_FP17                     0.000000          400.000000
SCALED_FP18                     0.000000          600.000000
SCALED_FP19                     0.000000          700.000000
SCALED_FP20                     0.000000          800.000000
SCALED_FP21                     0.000000          900.000000
SCALED_FP22                     0.000000         1000.000000
SCALED_FP23                     0.000000         2000.000000
SCALED_FP24                     0.000000         3000.000000
SCALED_FP25                     0.000000         4000.000000
SCALED_FP26                     0.000000         5000.000000
SCALED_FP27                     0.000000         6000.000000
SCALED_FP28                     0.000000         7000.000000
SCALED_FP29                     0.000000         8000.000000
SCALED_FP30                     0.000000         9000.000000
SCALED_FP31                     0.000000        10000.000000
SCALED_FP32                     0.000000        20000.000000

Register  Variable

3001      1-C9 Cal Gas Component.Mole %.PROPANE
3003      1-C9 Cal Gas Component.Mole %.i-BUTANE
3005      1-C9 Cal Gas Component.Mole %.n-BUTANE
3007      1-C9 Cal Gas Component.Mole %.NEOPENTANE
3009      1-C9 Cal Gas Component.Mole %.i-PENTANE
3011      1-C9 Cal Gas Component.Mole %.n-PENTANE
3013      1-C9 Cal Gas Component.Mole %.NITROGEN
3015      1-C9 Cal Gas Component.Mole %.METHANE
3017      1-C9 Cal Gas Component.Mole %.CARBON DIOXIDE
3019      1-C9 Cal Gas Component.Mole %.ETHANE
3021      1-C9 Cal Gas Component.Mole %.n-NONANE
3023      1-C9 Cal Gas Component.Mole %.n-HEXANE
3025      1-C9 Cal Gas Component.Mole %.n-HEPTANE
3027      1-C9 Cal Gas Component.Mole %.n-OCTANE
3029      1-C9 Cal Gas Component.Mole %.H2S
3031      Heaters.Temperature.Heater 1
3033      Heaters.Temperature.Heater 2
3035      Heaters.Temperature.Heater 3
3037      Electronic Pressure Control.Current Pressure.EPC1
3039      Electronic Pressure Control.Current Pressure.EPC2
3041      Heaters.Setpoint.Heater 4
3043      1-C9 Cal Gas Component.Ret Time.PROPANE
3045      1-C9 Cal Gas Component.Ret Time.i-BUTANE
3047      1-C9 Cal Gas Component.Ret Time.n-BUTANE
3049      1-C9 Cal Gas Component.Ret Time.NEOPENTANE
3051      1-C9 Cal Gas Component.Ret Time.i-PENTANE
3053      1-C9 Cal Gas Component.Ret Time.n-PENTANE
```

```
                                                         SAMPLE cont.

3055      1-C9 Cal Gas Component.Ret Time.NITROGEN
3057      1-C9 Cal Gas Component.Ret Time.METHANE
3059      1-C9 Cal Gas Component.Ret Time.CARBON DIOXIDE
3061      1-C9 Cal Gas Component.Ret Time.ETHANE
3063      1-C9 Cal Gas Component.Ret Time.n-NONANE
3065      1-C9 Cal Gas Component.Ret Time.n-HEXANE
3067      1-C9 Cal Gas Component.Ret Time.n-HEPTANE
3069      1-C9 Cal Gas Component.Ret Time.n-OCTANE
3071      1-C9 Cal Gas Component.Ret Time.H2S
3073      1-C9 Cal Gas.Base Press
3075      1-C9 Cal Gas.Tot Gross BTU
3077      1-C9 Cal Gas.Gross Dry BTU
3079      2-C6 Chamber.Gross Sat BTU
3081      1-C9 Cal Gas.Act Gross BTU
3083      1-C9 Cal Gas.Net Dry BTU
3085      1-C9 Cal Gas.Tot Net BTU
3087      1-C9 Cal Gas.Net Sat BTU
3089      1-C9 Cal Gas.Act Net BTU
3091      2-C6 Chamber.Tot Liq Vol
3093      2-C6 Chamber.Gal/1000 SCF C2+
3095      1-C9 Cal Gas.Gal/1000 SCF C3+
3097      1-C9 Cal Gas.Gal/1000 SCF C4+
3099      1-C9 Cal Gas.Gal/1000 SCF C5+
3101      1-C9 Cal Gas.Gal/1000 SCF C6+
3103      1-C9 Cal Gas.Tot Sup MJ/m3
3105      1-C9 Cal Gas.Sup Dry MJ/m3
3107      1-C9 Cal Gas.Tot Inf MJ/m3
3109      1-C9 Cal Gas.Inf Dry Corr MJ/kg
3111      1-C9 Cal Gas.Sup Dry Corr MJ/kg
3113      1-C9 Cal Gas.Inf Dry MJ/kg
3115      1-C9 Cal Gas.Cycle Time
3117      1-C9 Cal Gas.Analysis Time
3119      1-C9 Cal Gas.Wobbe Index
3121      1-C9 Cal Gas.Real Rel Den Gas
3123      1-C9 Cal Gas.Unnormalized Mole %
3125      1-C9 Cal Gas.Z factor

Register  Data Type    Access      Zero Scale  Full Scale

3001      FLOAT        RD_ONLY
3003      FLOAT        RD_ONLY
3005      FLOAT        RD_ONLY
3007      FLOAT        RD_ONLY
3009      FLOAT        RD_ONLY
3011      FLOAT        RD_ONLY
3013      FLOAT        RD_ONLY
3015      FLOAT        RD_ONLY
3017      FLOAT        RD_ONLY
3019      FLOAT        RD_ONLY
3021      FLOAT        RD_ONLY
3023      FLOAT        RD_ONLY
```

```
                                                        SAMPLE cont.

3025      FLOAT        RD_ONLY
3027      FLOAT        RD_ONLY
3029      FLOAT        RD_ONLY
3031      FLOAT        RD_ONLY
3033      FLOAT        RD_ONLY
3035      FLOAT        RD_ONLY
3037      FLOAT        RD_ONLY
3039      FLOAT        RD_ONLY
3041      FLOAT        RD_WR
3043      FLOAT        RD_ONLY
3045      FLOAT        RD_ONLY
3047      FLOAT        RD_ONLY
3049      FLOAT        RD_ONLY
3051      FLOAT        RD_ONLY
3053      FLOAT        RD_ONLY
3055      FLOAT        RD_ONLY
3057      FLOAT        RD_ONLY
3059      FLOAT        RD_ONLY
3061      FLOAT        RD_ONLY
3063      FLOAT        RD_ONLY
3065      FLOAT        RD_ONLY
3067      FLOAT        RD_ONLY
3069      FLOAT        RD_ONLY
3071      FLOAT        RD_ONLY
3073      FLOAT        RD_ONLY
3075      FLOAT        RD_ONLY
3077      FLOAT        RD_ONLY
3079      FLOAT        RD_ONLY
3081      FLOAT        RD_ONLY
3083      FLOAT        RD_ONLY
3085      FLOAT        RD_ONLY
3087      FLOAT        RD_ONLY
3089      FLOAT        RD_ONLY
3091      FLOAT        RD_ONLY
3093      FLOAT        RD_ONLY
3095      FLOAT        RD_ONLY
3097      FLOAT        RD_ONLY
3099      FLOAT        RD_ONLY
3101      FLOAT        RD_ONLY
3103      FLOAT        RD_ONLY
3105      FLOAT        RD_ONLY
3107      FLOAT        RD_ONLY
3109      FLOAT        RD_ONLY
3111      FLOAT        RD_ONLY
3113      FLOAT        RD_ONLY
3115      FLOAT        RD_ONLY
3117      FLOAT        RD_ONLY
3119      FLOAT        RD_ONLY
3121      FLOAT        RD_ONLY
3123      FLOAT        RD_ONLY
3125      FLOAT        RD_ONLY
************************************************************************************
```

SAMPLE cont.

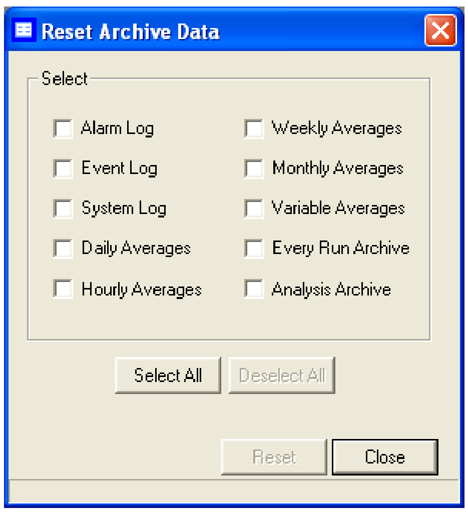
```
Report from Model  Austin
03/12/2009 12:52:10 PM

Report Name            Report Type

Analysis               Analysis
Calibration            Calibration
Final Calibration      Final Calibration
Raw Data               Raw Data
Every Run              Everyrun Average
Hourly                 Hourly Average
24 Hour                Daily Average
Weekly                 Weekly Average
Monthly                Monthly Average
Variable               Variable Average



Report Name            Report Template

Analysis               /home/Daniel/ReportTemplates/Default_AnalysisReport.xml
Calibration            /home/Daniel/ReportTemplates/CalibrationReport.xml
Final Calibration      /home/Daniel/ReportTemplates/FinalCalibrationReport.xml
Raw Data               /home/Daniel/ReportTemplates/RawDataAvgReport.xml
Every Run              /home/Daniel/ReportTemplates/EveryrunAvgReport.xml
Hourly                 /home/Daniel/ReportTemplates/HourlyAvgReport.xml
24 Hour                /home/Daniel/ReportTemplates/DailyAvgReport.xml
Weekly                 /home/Daniel/ReportTemplates/WeeklyAvgReport.xml
Monthly                /home/Daniel/ReportTemplates/MonthlyAvgReport.xml
Variable               /home/Daniel/ReportTemplates/VariableAvgReport.xml


*************************************************************************************
```

5.13 Deleting archived data from the gas chromatograph

To delete archived data and reset the GC memory, do the following:

1. Select **Reset Archive Data...** from the **Logs/Reports** menu. The *Reset Archive Data* window displays.

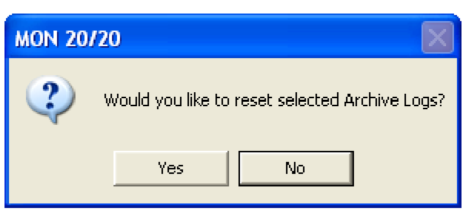
Figure 5-49. The Reset Archive Data window



2. Select the types of data that you want to delete.

Note
To select all the options, click Select All. To clear all options, click Deselect All.

3. Click **Reset**. MON 20/20 displays a confirmation dialog.



4. Click **Yes**. MON 20/20 clears the GC's memory. New archived records will begin accumulating again as analysis and calibration runs occur.

5.14 The molecular weight vs. response factor graph

The *Molecular Weight Vs. Response Factor* window, which can be useful in checking valve function, displays a graph that consists of the following information:

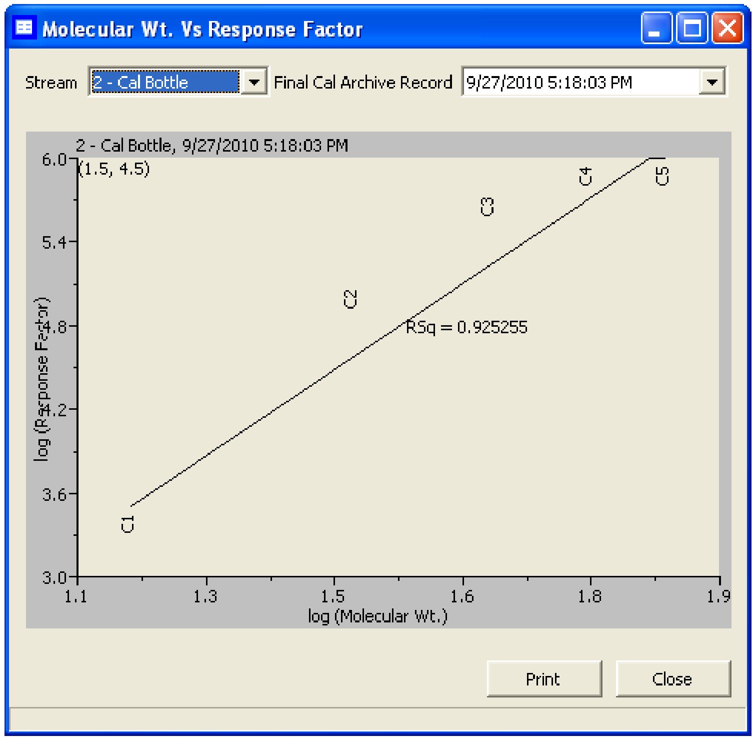
- Log (Molecular Weight) vs. Log (Response Factor) scatter plot graph showing the actual measured values for the following "normal" alkanes:
  - Methane (C1)
  - Ethane (C2)
  - Propane (C3)
  - Butane (C4)
  - Pentane (C5)
- A trend line (best fit straight line);

Note
The ideal trend line would be linear.

- R-squared correlation coefficient.

Note
The closer RSq is to 1, the better.

Figure 5-50. Molecular Weight vs. Response Factor window



This graph is only available for calibration streams, which can be selected from the *Stream* drop-down list. By default, the newest final calibration data is used to generate the graph, but any archived final calibration file can be used by selecting it from the *Final Calibration Record* drop-down list.

To print the graph, click **Print**.

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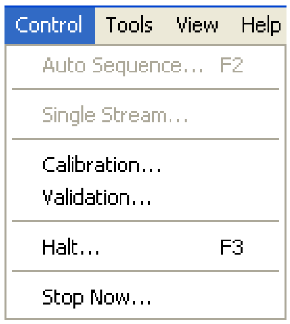
Section 6: Controlling Analyses



The options in the Control pull-down menu allow you to manage analysis runs as well as calibration, validation and baseline runs. Control menu commands also allow you to stop an analysis run immediately or at the end of the run.

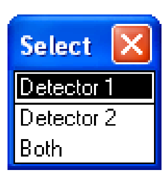
6.1 Halting an analysis

Before a new analysis run can be initiated, the current analysis must be stopped. To stop the current analysis at the end of its cycle, do the following:

1. There are three ways to halt an analysis run:
   - Select **Halt...** from the **Control** menu.
   - Press **F3**.
   - Click  on the Toolbar.

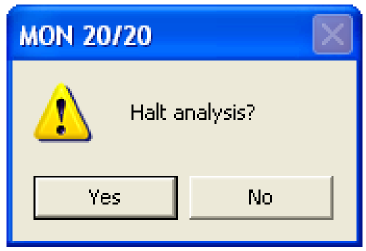
   If you running in a mode that uses two detectors, MON 20/20 displays a selector window.

Figure 6-1. The selector window



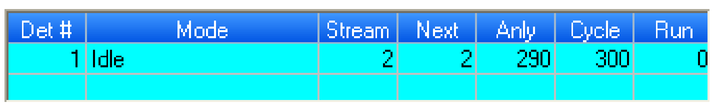
2. Choose the appropriate detector. A confirmation message displays.

Figure 6-2. Confirmation message



3. Click **Yes** and the analysis will stop at the end of the current cycle. Use the *Mode* column on the **GC Status Bar** to monitor the status of the operation. When the analysis has halted, the Mode value will be "Idle".

Figure 6-3. The GC Status Bar



Det #	Mode	Stream	Next	Anly	Cycle	Run
1	Idle	2	2	290	300	0

6.2 Auto sequencing

Use this function to start continuous GC analysis runs that follow a predefined stream sequence. See "Creating a stream sequence for a detector" on page 4-78 for detailed instructions on configuring the predefined sequence.

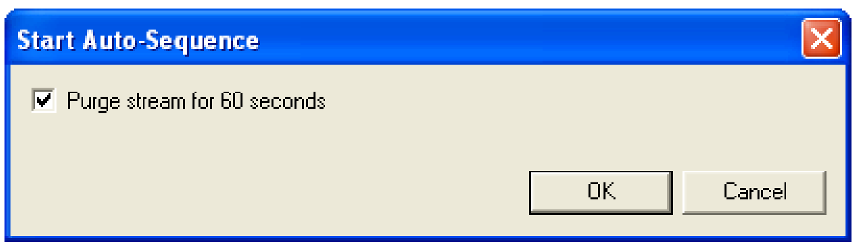
Note
If an analysis run is in progress, it must be stopped before auto sequencing can be started. See "Stopping an Analysis Run" on page 6-9 for more information.

To initiate auto-sequencing, do the following:

1. There are three ways of initiating auto sequencing:
    - Select **Auto Sequence...** from the **Control** menu.
    - Press **F2**.
    - Click  on the Toolbar.

    A confirmation message displays.

Figure 6-4. Confirmation message

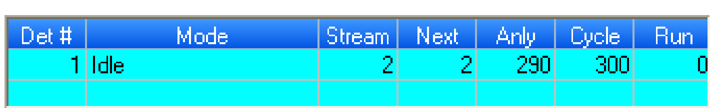


2. Check the *Purge stream for 60 seconds* check box to set the purging option. The checkbox is selected by default.

Note
Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

3. Click **Yes** and auto sequencing starts. Use the *Mode* column on the **GC Status Bar** to monitor the status of the analysis run.

Figure 6-5. The GC Status Bar



Note
To view the results of the Auto Sequence run, select **Report Display** from the **Logs/ Reports** menu.

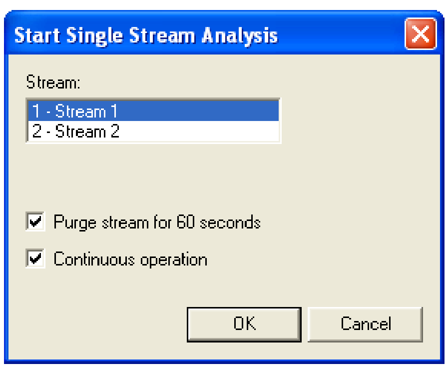
6.3 Analyzing a single stream

Note
If an analysis run is in progress, it must be stopped before auto sequencing can be started. See "Stopping an Analysis Run" on page 6-9 for more information.

To start an analysis run on a single calibration or sample stream, do the following:

1. Select **Single Stream...** from the **Control** menu. A confirmation message displays.

Figure 6-6. Confirmation message



2. Select a stream from the **Stream** menu.
3. Check the *Purge stream for 60 seconds* check box to set the purging option. The checkbox is selected by default.

Note
Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

---

4. Check the *Continuous operation* check box to set or unset repetitive analysis. The checkbox is selected by default.
5. Click **OK** and the analysis starts. Use the *Mode* column on the **GC Status Bar** to monitor the status of the analysis run.

Figure 6-7. The GC Status Bar

Det #	Mode	Stream	Next	Anly	Cycle	Run
1	Idle	2	2	290	300	0

Note
To view the results of the Auto Sequence run, select Report Display from the Logs/ Reports menu.

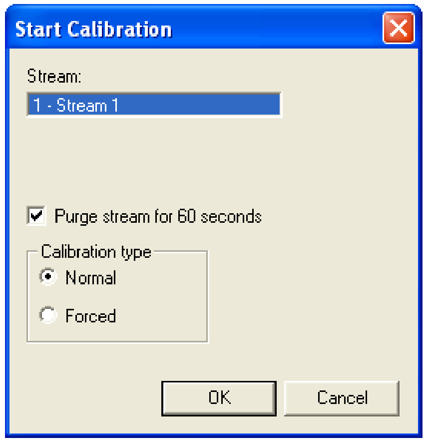
6.4 Calibrating the gas chromatograph

Calibration runs are determined by the CDT and Streams settings. See "Managing Component Data Tables" on page 4-5 and "Creating a stream sequence for a detector" on page 4-78 for detailed instructions on how to edit these settings.

To calibrate a GC, do the following:

1. Select **Calibration...** from the **Control** menu. The *Start Calibration* window displays.

Figure 6-8. The Start Calibration window



Note
If the GC is in *Auto Sequence* mode, calibration will not start until two or more analysis runs have been completed. This delay is required to complete the current analysis and the analysis of the stream currently purging through the valve.

2. Select a stream from the **Stream** menu.
3. Check the *Purge stream for 60 seconds* check box to set the purging option. The checkbox is selected by default.

Note
Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

4. Select the desired calibration type.

   (a.) Select **Normal** to perform a manual calibration in which the CDT for the selected stream(s) will be updated with calibration data *unless* the data is outside the acceptable deviations, as listed on the CDT. For more information, see "Managing Component Data Tables" on page 4-5.

(b.) Select **Forced** to perform a manual calibration in which the CDT for the selected stream(s) will be updated with calibration data *even if* that data is outside the acceptable deviations, as listed on the CDT. For more information, see "Managing Component Data Tables" on page 4-5.

5. Click **OK** and the calibration starts. Use the *Mode* column on the **GC Status Bar** to monitor the status of the operation.

Figure 6-9. The GC Status Bar

Det #	Mode	Stream	Next	Anly	Cycle	Run
1	Idle	2	2	290	300	0

Note
To view the results of the Auto Sequence run, select Report Display from the Logs/ Reports menu.

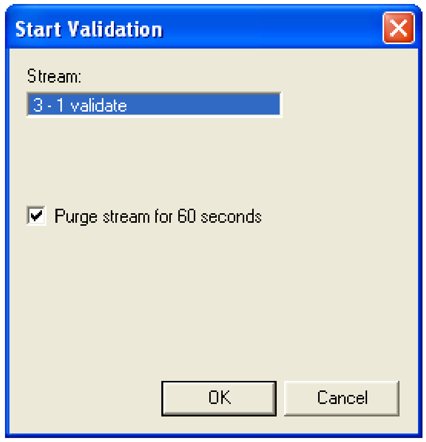
6.5 Validating the Gas Chromatograph

During a validation run, the GC performs a test analysis to verify that it is working properly. The test analysis is performed on a gas whose component concentrations are already known; if the GC's results deviate significantly from the predetermined data, an alarm is generated. Validation runs are determined by the validation data table and streams settings. See "Managing Validation Data Tables" on page 4-35 and "Creating a stream sequence for a detector" on page 4-78 for detailed instructions on how to edit these settings.

To validate the GC, do the following:

1. Select **Validation...** from the **Control** menu. The *Start Validation* window displays.

Figure 6-10. The Start Validation window



Note
If the GC is in *Auto Sequence* mode, validation will not start until two or more analysis runs have been completed. This delay is required to complete the current analysis and the analysis of the stream currently purging through the valve.

2. Check the *Purge stream for 60 seconds* check box to set the purging option. The checkbox is selected by default.

Note
Purging allows sample gas to flow through the sample loop for 60 seconds prior to beginning the first analysis.

3. Click **OK** and the validation starts. Use the *Mode* column on the **GC Status Bar** to monitor the status of the operation.

Figure 6-11. The GC Status Bar

Det #	Mode	Stream	Next	Anly	Cycle	Run
1	Idle	2	2	290	300	0

6.6 Stopping an Analysis Run

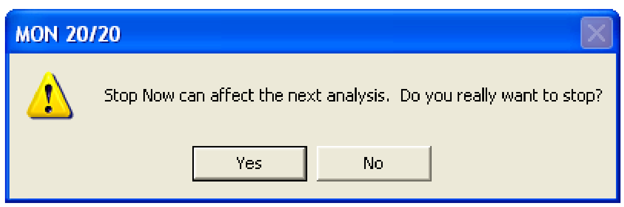
Note
This function forces the system into Idle mode. If Stop Now is performed while an analysis is in progress, the components may continue to elute from the columns during. No analysis data will be generated.

Do not perform a Stop Now unless absolutely necessary. Whenever possible, use the Halt function.

To *immediately* stop an analysis run, do the following:

1. Select **Stop Now...** from the **Control** menu. A confirmation message displays.

Figure 6-12. Confirmation message



2. Click **Yes** and the current analysis stops.

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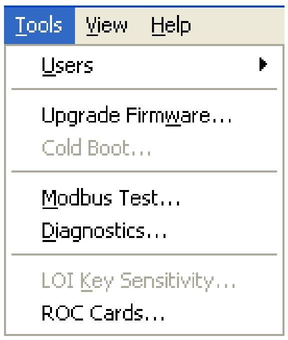
Section 7: Using MON 20/20 Tools



The options in the Tools pull-down menu allow you to do the following:

- Use the Modbus Test program to confirm that data is being accurately relayed from the gas chromatograph to the PC.
- Manage users.
- Adjust the sensitivity of the LOI keys.
- Install upgrades to the GC.

7.1 Using the Modbus Test program

Use the Modbus program to poll the GC's Modbus registers (or registers from another device) to confirm that data is accurately relayed from the gas chromatograph to the PC. Then, as necessary, assign data types to the returned data. See "Assigning scale ranges to User_Modbus registers" on page 7-15 for more information. You can save all settings to a file for future reference.

You can use this program to facilitate software debugging or for special installations. With this program, you can troubleshoot any device that employs registers including the GC, an ultrasonic meter, or a flow computer.

CAUTION

NOT REQUIRED FOR NORMAL GC OPERATION

The Modbus Test is reserved for advanced functions. The Modbus Test function is not required for normal GC operation. Skip this section unless you are developing software, engaging in a software debugging process, or designing a custom installation that directly accesses the GC Controller Modbus registers.

Traditionally, Modbus registers are polled by using a data collection system (DCS). To facilitate installation and debugging, the Modbus program emulates a DCS.

This section provides detailed instructions for using the Modbus program. Use this program only if you are familiar with Modbus communication protocol and the operation of MON 20/20.

7.1.1 Comparing Modbus protocols

MON 20/20 and the Modbus program can accommodate two different Modbus protocols: **SIM_2251** and **User_Modbus**. Separate Modbus registers are reserved for each protocol; therefore, some settings for MON 20/20 and WinMB depend on which Modbus protocol is used.

The protocol you need depends, ultimately, on the hardware used for data acquisition from the GC Modbus register contents.

The following comparison should help clarify the differences between the two protocols as well as the utility of each.

Table 7-1. Comparing SIM_2251 and User_Modbus Protocols

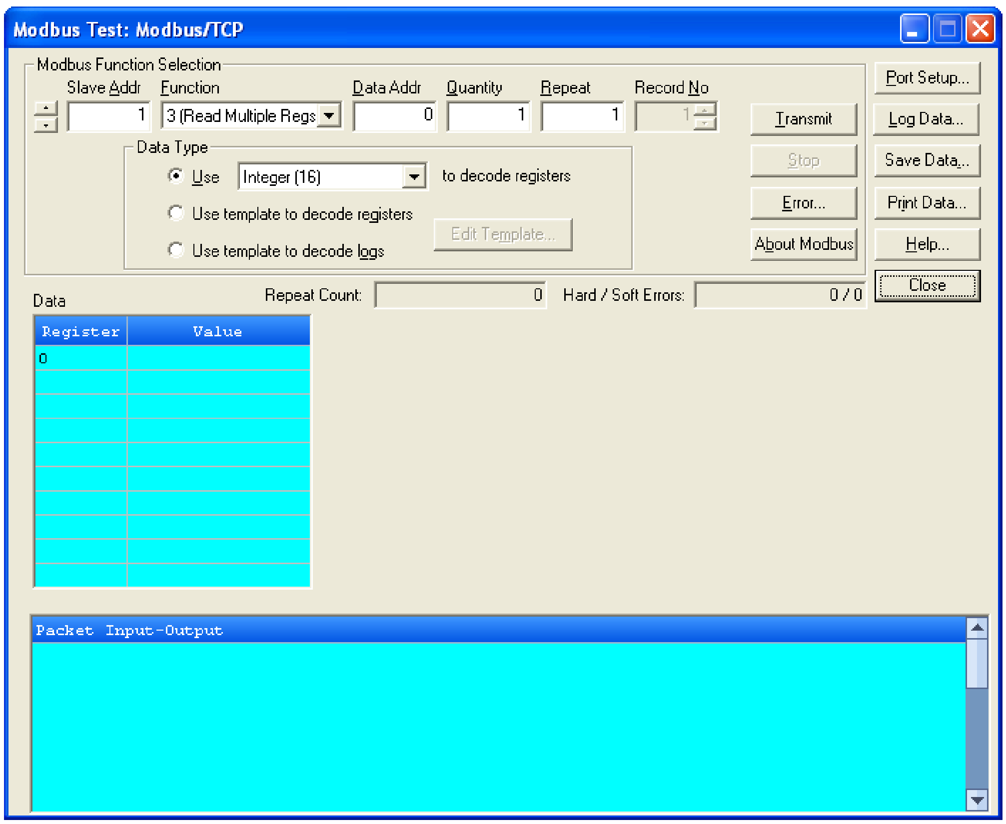
SIM_2251	User_Modbus
Serial slave port	Serial slave port
Modified protocol that allows floating point numbers to be transmitted over Modbus via 2251 emulation slave type	Standard Gould protocol that accommodates PLC Emulation LO-HI (PLC-LH)
Most register contents are predefined; some registers can be user-defined	Predefined Boolean (coils) User-defined Numeric (registers)
Data types are predefined for registers 1000 to 9000	Data types are user-defined
Variables assigned to registers can be listed in the GC Config Report. For instructions and an example report, see Section 5.12. See Appendix C for more detail about individual registers.	Variables assigned to registers can be listed in the GC Config Report. For instructions and an example report, see Section 5.12. See Appendix C for more detail about individual registers.
When using the Modbus program, set *Register Mode* to “DANIEL” to view register contents.	When using the Modbus program, set *Register Mode* to “PLC- LH” or “PLC-HL” to view register contents.
It is not necessary to assign scales to registers.	It may be necessary to assign scales to registers, to convert floating point values to whole integer representations.

7.1.2 Setting communication parameters

To determine or reset the communications parameters used by the Modbus program, do the following:

1. Select **Modbus Test...** from the **Tools** menu. The *Modbus Test Program* window displays. The current port settings display in the window's title bar.

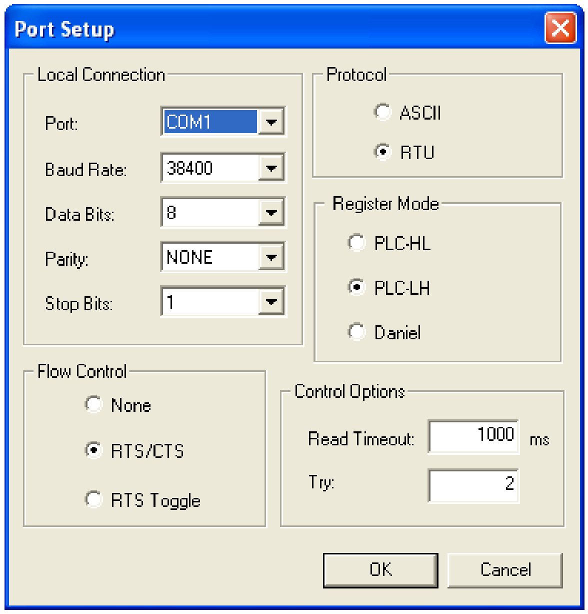
Figure 7-1. The Modbus Test Program window with current port setting in title bar



Note
If MON 20/20 displays an error message, verify the installation directory via the Program Settings window (see Section 1.2.5).

2. Click **Port Setup**. The *Port Setup* window appears.

Figure 7-2. The Port Setup window



3. Make the appropriate configuration changes. The following table lists the typical setting for each parameter:

Parameter	Typical Setting
Port	COM1 or COM2
Baud Rate	9600
Data Bits	7 or 8
Parity	Even or None
Stop Bits	1
Flow Control	None
Read Timeout	500 ms
Try	2
Register Mode	Daniel (SIM_2251) PLC-LH (User_Modbus)

Parameter	Typical Setting
Protocol	ASCII Modbus RTU Modbus

Note
For a direct connection to the GC, ensure that the port setting is the same as the Com ID number of the serial port used.

4. Click **OK**.

7.1.3 Getting Modbus Data

To read or write register contents to the GC, or any other device, do the following:

Note
Before retrieving data, print a GC Config Report (see Section 5.12) and review the Communication section to learn the variable names that are assigned to the Modbus registers.

Note
Modbus registers assigned to alarms are application-specific.

1. In the *Slave Addr* field, type the COM ID of the GC. The Modbus program will accept a slave address value of **1** to **247**.

   To use Broadcast Mode, which directs the Modbus program to poll all known devices, enter **0** in the *Slave Addr* field. Each device interprets this poll attempt as an instruction to read and take action; however, a response message may not be received by the Modbus program.

Note
Changes are applied to the corresponding register value at each device.

2. Select the desired read or write option from the *Function* pull down menu.

Function Code	Description	Broadcast
1 (Read Coil)	Reads one or more coil values.	
2 (Read Input Status)	Reads one or more input status values.	
3 (Read Multiple Regs)	Reads one or more register values.	
4 (Read Input Regs)	Reads one or more input register values.	
5 (Set Single Coil)	set (write) one coil value	✓
6 (Set Single Reg)	set (write) one register value	✓
15 (Set Multiple Coils)	set (write) multiple coil values	✓
16 (Set Multiple Regs)	set (write) multiple register values	✓

3. Type the starting register value in the *Data Addr* field.

Note
The data type is set automatically by the Modbus program, based on the specified data address.

4. In the *Quantity* field, type the number of registers to be retrieved. The Modbus program will accept a quantity value of **1** to **2016**. The requested number of registers cannot exceed the amount contained by the selected message block but you *can* retrieve a partial block. You cannot cross a message block boundary.

   Also, in Standard Modbus mode each register is 16 bits. Therefore, integers (SHORT) consist of 1 register while floats (FLOAT) and long integers (LONG) consist of 2 registers.

Note
Boolean registers are not user-defined (for either SIM_2251 or User_Modbus) and primarily contain alarm flags useful for debugging. To view the contents of Boolean registers, select the **1 (Read Coil)** function code.

Numeric registers for User_Modbus can be user-defined. To view the contents of Numeric registers, select the **3 (Read Regs)** function code.

5. Type the desired repeat count, which is the number of times the Modbus program should read or set the specified registers before ceasing transmission, in the *Repeat* field. The Modbus program will accept a repeat value of **1** to **9999**. A value of **–1** produces an infinite polling loop that can be terminated by clicking **Stop**.

7.1.4 Transmitting using a single data type

To assign a data type to a group of registers you will read or edit, do the following:

Note
Before retrieving data, print a GC Config Report (see Section 5.12) and review the Communication section to learn the variable names that are assigned to the Modbus registers.

---

1. In the *Slave Addr* field, type the COM ID of the GC. The Modbus program will accept a slave address value of **1** to **247**.

   To use Broadcast Mode, which directs the Modbus program to poll all known devices, enter **0** in the *Slave Addr* field. Each device interprets this poll attempt as an instruction to read and take action; however, a response message may not be received by the Modbus program.

Note
Changes are applied to the corresponding register value at each device.

---

2. Select the desired read or write option from the *Function* pull down menu.

Function Code	Description	Broadcast
1 (Read Coil)	Reads one or more coil values.	
2 (Read Input Status)	Reads one or more input status values.	
3 (Read Multiple Regs)	Reads one or more register values.	
4 (Read Input Regs)	Reads one or more input register values.	
5 (Set Single Coil)	set (write) one coil value	✓
6 (Set Single Reg)	set (write) one register value	✓
15 (Set Multiple Coils)	set (write) multiple coil values	✓
16 (Set Multiple Regs)	set (write) multiple register values	✓

3. Type the starting register value in the *Data Addr* field.

Note
The data type is set automatically by the Modbus program, based on the specified data address.

4. In the *Quantity* field, type the number of registers to be retrieved. The Modbus program will accept a quantity value of **1** to **2016**. The requested number of registers cannot exceed the amount contained by the selected message block but you *can* retrieve a partial block. You cannot cross a message block boundary.

   Also, in Standard Modbus mode each register is 16 bits. Therefore, integers (SHORT) consist of 1 register while floats (FLOAT) and long integers (LONG) consist of 2 registers.

Note
Boolean registers are not user-defined (for either SIM_2251 or User_Modbus) and primarily contain alarm flags useful for debugging. To view the contents of Boolean registers, select the **1 (Read Coil)** function code.

Numeric registers for User_Modbus can be user-defined. To view the contents of Numeric registers, select the **3 (Read Regs)** function code.

5. Type the desired repeat count, which is the number of times the Modbus program should read or set the specified registers before ceasing transmission, in the *Repeat* field. The Modbus program will accept a repeat value of **1** to **9999**. A value of **–1** produces an infinite polling loop that can be terminated by clicking **Stop**.
6. Select the *Use* <data type> *to decode registers* check box.
7. Select a data type from the pull-down menu. The following table lists the default data types for each block of SIM_2251 registers.

Register Range	Default Type
1000 – 2999	Boolean
3000 – 4999	Integer
5000 – 6900	Long
7000 – 8999	Float

Note
To ensure the best data type assignments, review a GC Config Report.

8. Click **Transmit** to retrieve the selected registers (i.e., the specified data addresses) from the GC. The transmitted/received packet data displays in the *Packet Input-Output* window.
9. Click **Stop** to end the transmission of the data and to return to the **Modbus Function Selection** options.

7.1.5 Transmitting using a template

Templates are best used when decoding mixed data types because the template contains data that the Modbus program can use to determine which data type should be assigned to which register.

To create a new template or to use an existing template, do the following:

Note
Before retrieving data, print a GC Config Report (see Section 5.12) and review the Communication section to learn the variable names that are assigned to the Modbus registers.

1. In the *Slave Addr* field, type the COM ID of the GC. The Modbus program will accept a slave address value of **1** to **247**.

   To use Broadcast Mode, which directs the Modbus program to poll all known devices, enter **0** in the *Slave Addr* field. Each device interprets this poll attempt as an instruction to read and take action; however, a response message may not be received by the Modbus program.

Note
Changes are applied to the corresponding register value at each device.

2. Select the desired read or write option from the *Function* pull down menu.

Function Code	Description	Broadcast
1 (Read Coil)	Reads one or more coil values.	
2 (Read Input Status)	Reads one or more input status values.	
3 (Read Multiple Regs)	Reads one or more register values.	
4 (Read Input Regs)	Reads one or more input register values.	
5 (Set Single Coil)	set (write) one coil value	✓
6 (Set Single Reg)	set (write) one register value	✓
15 (Set Multiple Coils)	set (write) multiple coil values	✓
16 (Set Multiple Regs)	set (write) multiple register values	✓

3. Type the starting register value in the *Data Addr* field.

Note
The data type is set automatically by the Modbus program, based on the specified data address.

---

4. In the *Quantity* field, type the number of registers to be retrieved. The Modbus program will accept a quantity value of **1** to **2016**. The requested number of registers cannot exceed the amount contained by the selected message block but you *can* retrieve a partial block. You cannot cross a message block boundary.

   Also, in Standard Modbus mode each register is 16 bits. Therefore, integers (SHORT) consist of 1 register while floats (FLOAT) and long integers (LONG) consist of 2 registers.

Note
Boolean registers are not user-defined (for either SIM_2251 or User_Modbus) and primarily contain alarm flags useful for debugging. To view the contents of Boolean registers, select the **1 (Read Coil)** function code.

Numeric registers for User_Modbus can be user-defined. To view the contents of Numeric registers, select the **3 (Read Regs)** function code.

---

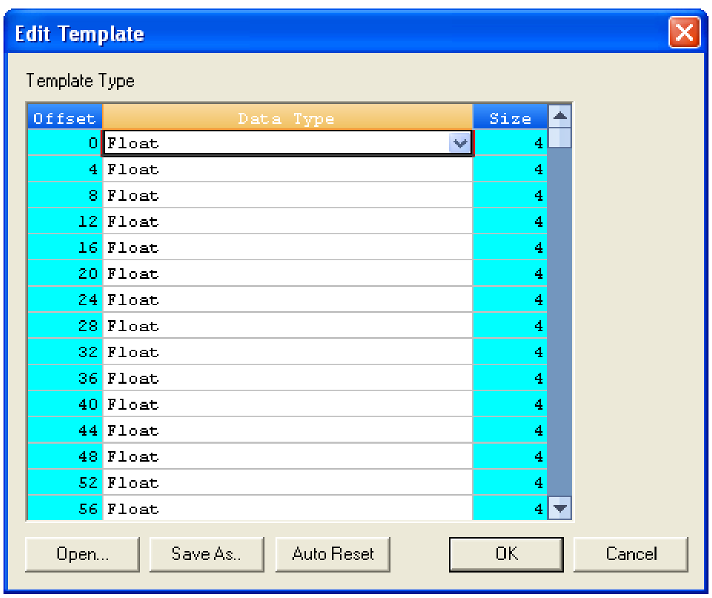
5. Type the desired repeat count, which is the number of times the Modbus program should read or set the specified registers before ceasing transmission, in the *Repeat* field. The Modbus program will accept a repeat value of **1** to **9999**. A value of **–1** produces an infinite polling loop that can be terminated by clicking **Stop**.
6. Depending on your intent, select *Use template to decode registers* or *Use template to decode logs*. The *Record No* field becomes active.
7. Enter the desired record number in the *Record No* field. To verify which record number should be entered, consult the Modbus specifications for your device. For more information on GC Modbus registers, see Appendix C.

The following table describes the relationship between templates and record numbers:

Data Type Setting	Other Setting(s)	Result
Register template	• Enter *Data Addr* value. • Enter *Record No.* value. • Enter *Quantity* value.	Read Quantity fields (i.e., the number of fields specified by the Quantity setting) from the specified Record No. of the register (Data Addr).
Log template	• Enter *Record No.* value.	Read all fields associated with the Record No.
	• Enter *Data Addr* value. • Enter "0" for the *Record No.* value.	Read all fields in all records for the specified log register (Data Addr).

8. Click **Edit Template**. The *Template File* window displays with a new template.

Figure 7-3. The Edit Template window



9. To open an existing template file, click **Open**. The *Select Template Configuration File* dialog displays.

10. Locate and select the template file, and then click **Open**. Template files are saved with the .cfg extension.

11. To edit the template, select a data type for each desired offset.
12. To change all offsets to the same data type, change the first offset to the desired data type, and then click **Auto Reset**. The data type for the remainder of the offsets switch to the data type of the first offset.
13. To save the displayed file to disk, click **Save As...**. The *Select Template Configuration File* dialog appears. Type in a filename and click **Save**.
14. Click **OK** to apply your selections and return to the main window.

7.1.6 Setting the log parameters

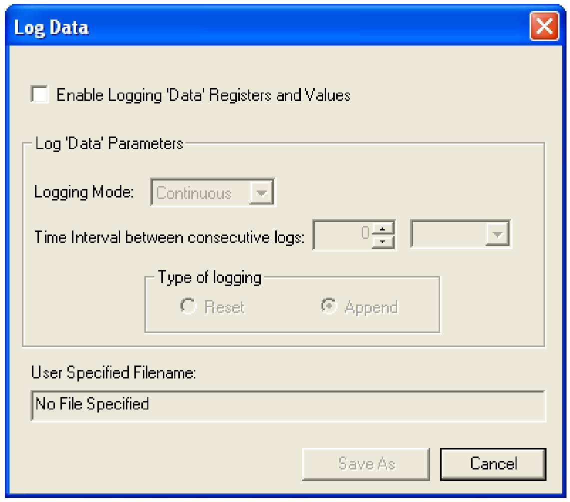
The *Log Data* window allows you to log the polled data to a specified file.

Note
The Log Data function is not necessary to transmit Modbus data. To disable this function, clear the *Enable Logging 'Data' Registers and Values* check box on the *Log Data* window.

To set the log parameters for the Modbus program, do the following:

1. Click **Log Data**. The *Log Data* window displays.

Figure 7-4. The Log Data window



2. Select the *Enable Logging 'Data' Registers and Values* check box to enable data logging and to activate the **Log Data Parameters** section.

3. Select a **Logging Mode** from the pull-down menu. You have the following options:

    - **Continuous** mode records the polled data continuously until the connection is terminated or data logging is disabled by clearing the *Enable Logging 'Data' Registers and Values* check box.
    - **Sampling** mode records the polled data based on the time interval that you set in the *Time Interval between consecutive logs* text box. Time intervals can be set in seconds, minutes, or hours.

4. Select a type of logging. You have the following options:

    - **Append** adds this log to the file specified, preserving previously logged data.
    - **Reset** deletes the previously-logged data and saves only this new log.

5. Click **Save As...**. The *Save As* window displays. The file can be saved as a tab-delimited text file or a Microsoft Excel file. Type in a filename and click **Save**.

7.1.7 Saving Modbus data

To save the data table to a separate file, do the following:

1. Click **Save Data**. The *Save 'Data' Displayed As* dialog appears. The file can be saved as a tab-delimited text file, an HTML file or a Microsoft Excel file.
2. Type in a filename and click **Save**.

7.1.8 Printing Modbus data

To print Modbus data, click **Print Data**. The standard print dialog displays.

MON 20/20 prints the report to your previously configured printer. See Section 1.7 for more information.

7.1.9 Assigning scale ranges to User_Modbus registers

By assigning scale ranges, floating point data can be converted to integer values. This is an optional task that applies to applications using the User_Modbus protocol.

Use the **Register** command described in Section 4.12.4, "Viewing or editing scales" on page 92 to assign scale ranges. See Appendix C for more information regarding the gas chromatograph's Modbus registers.

7.2 Troubleshooting communication errors

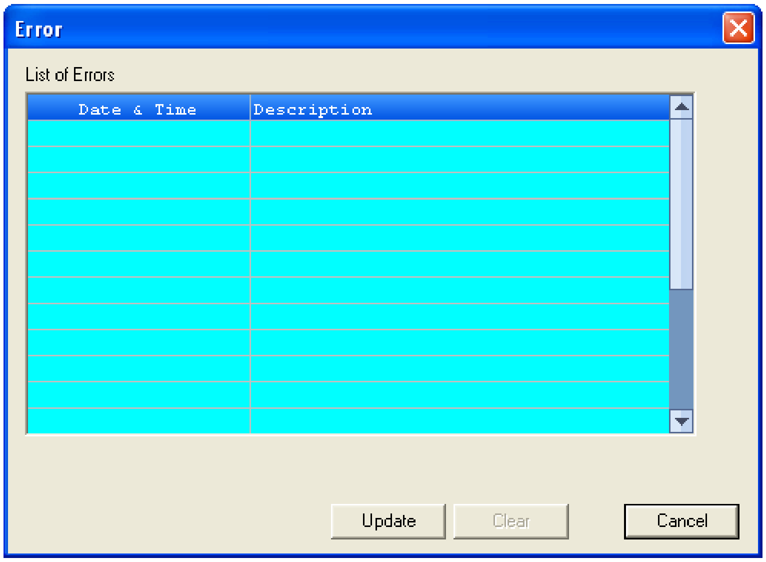
The Modbus program's Error Log is maintained in a circular buffer that holds up to 512 entries.

The Modbus program tracks the errors for a given session but does not store them. When you exit the Modbus program, all errors are cleared.

To view any communication errors that occurred during the data transfer, do the following:

1. Click **Error...**. The *Error* window appears.

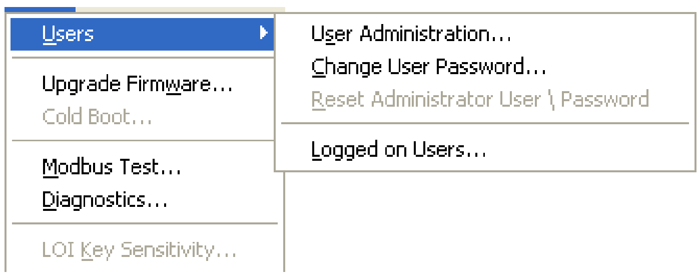
Figure 7-5. The Error window



Note
Double-click a *Description* cell to “scroll through” the displayed text.

2. To view all errors that have occurred in this session, click **Update**.
3. To delete all entries to date, click **Clear**.

7.3 Managing users



Use the User Administration commands to create or delete users, change passwords, and to monitor PC-to-GC connections.

Login security is at the gas chromatograph level instead of at the software level. This means that you no longer have to log in after starting MON 20/20—but you do have to log in to the gas chromatograph to which you are trying to connect. *This also means that if you create a new user, that user is only valid for the GC to which you are connected. You cannot connect to any other GC unless you create the same user on it first.*

MON 20/20 recognizes the following four user types, or roles, each with an increasing level of access to functionality:

- **Read-only** - A read-only user has the lowest level of access and can view data but cannot make any changes. A read-only user can change his or her password only.
- **Regular** - A regular user has all of the privileges of a read-only user, as well as the ability to acknowledge and clear alarms. A regular user can also control the GC through MON 20/20's Control menus. A regular user can change his or her password only and cannot create or delete other users.
- **Super User** - A super user has all of the privileges of a regular user, as well as the ability to manage and control the GC through MON 20/20's Application and Hardware menus. A super user can change his or her password only and cannot create or delete other users.
- **Administrator** - An administrator has complete access to all of MON 20/20's commands and functions, as well as the ability to manage all other users by creating or deleting user accounts, and changing passwords.

Note
Each GC ships with two administrator accounts: **daniel** and **emerson**. By default, these two accounts do not require a password, but a password can be added, if desired.

The following table lists in detail the functions and commands that are available to each user role:

Menu	Commands	Admin User	Super User	Regular User	Read-Only User
File	Connection Directory	Y	Y	Y	Y
	Program Settings	Y	Y	Y	Y
	Print Setup	Y	Y	Y	Y
Chromatograph	Connect	Y	Y	Y	Y
	Disconnect	Y	Y	Y	Y
	Chromatogram Viewer	Y	Y	Y	Y
	Chromatogram - Forced Cal	Y	Y	N	N
	GC Time	Y	Y	read-only	read-only
Hardware	Heaters	Y	Y	read-only	read-only
	Valves	Y	Y	read-only	read-only
	Detectors	Y	Y	read-only	read-only
	Discrete Inputs	Y	Y	read-only	read-only
	Discrete Outputs	Y	Y	read-only	read-only
	Analog Inputs	Y	Y	read-only	read-only
	Analog Outputs	Y	Y	read-only	read-only
	Installed Hardware	read-only	read-only	read-only	read-only
Application	System	Y	Y	read-only	read-only
	Component Data	Y	Y	read-only	read-only
	Timed Events	Y	Y	read-only	read-only
	Calculations - Control	Y	Y	read-only	read-only
	Calculations - Averages	Y	Y	read-only	read-only

Menu	Commands	Admin User	Super User	Regular User	Read-Only User
	Calculations - User Defined	Y	Y	read-only	read-only
	Limit Alarms	Y	Y	read-only	read-only
	System Alarms	Y	Y	read-only	read-only
	Streams	Y	Y	read-only	read-only
	Stream Sequence	Y	Y	read-only	read-only
	Communication	Y	Y	read-only	read-only
Logs/Reports	Unack/Active Alarms	Y	Y	Y	read-only
	Alarm Logs	read-only	read-only	read-only	read-only
	Ack/Clear Alarms	Y	Y	Y	N
	Maintenance Log	Y	Y	Y	read-only
	Event Log	read-only	read-only	read-only	read-only
	Report Display	read-only	read-only	read-only	read-only
	Archive Report	read-only	read-only	read-only	read-only
	Printer Control	Y	Y	Y	read-only
	Trend Data	read-only	read-only	read-only	read-only
	Reset Archive Data	Y	N	N	N
Control	Start Auto Seq	Y	Y	Y	N
	Start Single Stream	Y	Y	Y	N
	Halt	Y	Y	Y	N
	Calibration	Y	Y	Y	N
	Stop	Y	Y	Y	N
Tools	User Administration	Y	N	N	N
	Change User Password	Any	Own	Own	Own

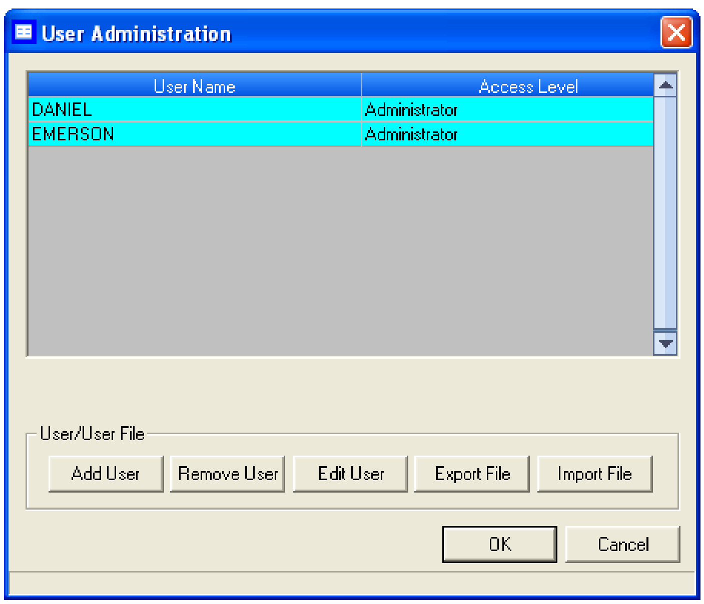
7.3.1 Creating users

Note
You must be logged in as an administrator.

To create a user, do the following:

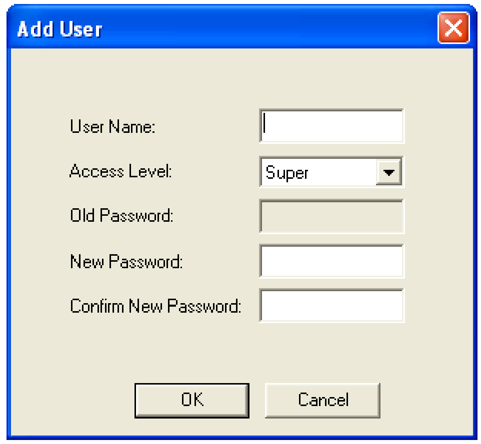
1. Select **Tools** → **Users** → **User Administration...**. The *User Administration* window appears, displaying a list of current users and their role levels.

Figure 7-6. The User Administration window



2. To add a user, click **Add User**. The *Add User* window displays.

Figure 7-7. The Add User window



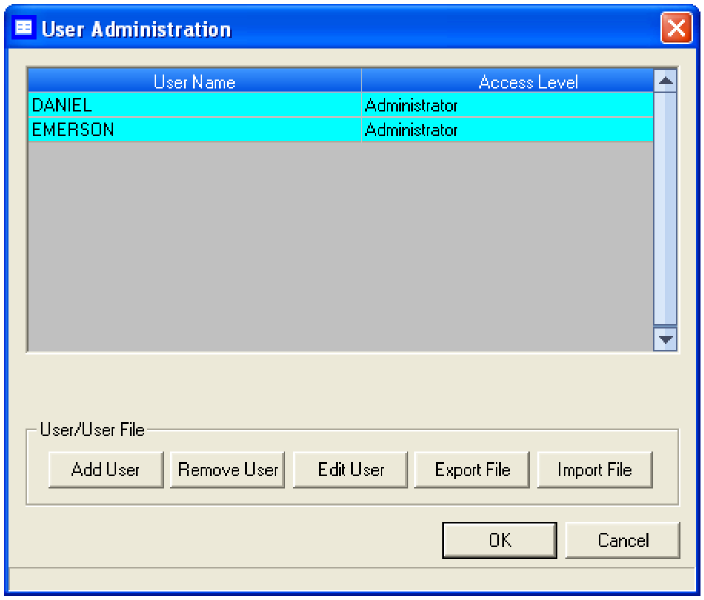
3. Enter the appropriate information into the text fields.
4. Click **OK**. MON 20/20 creates the new user and adds it to the User table on the *User Administration* window.

7.3.2 Exporting a list of user profiles

To save a list of users, along with their role levels and passwords, do the following:

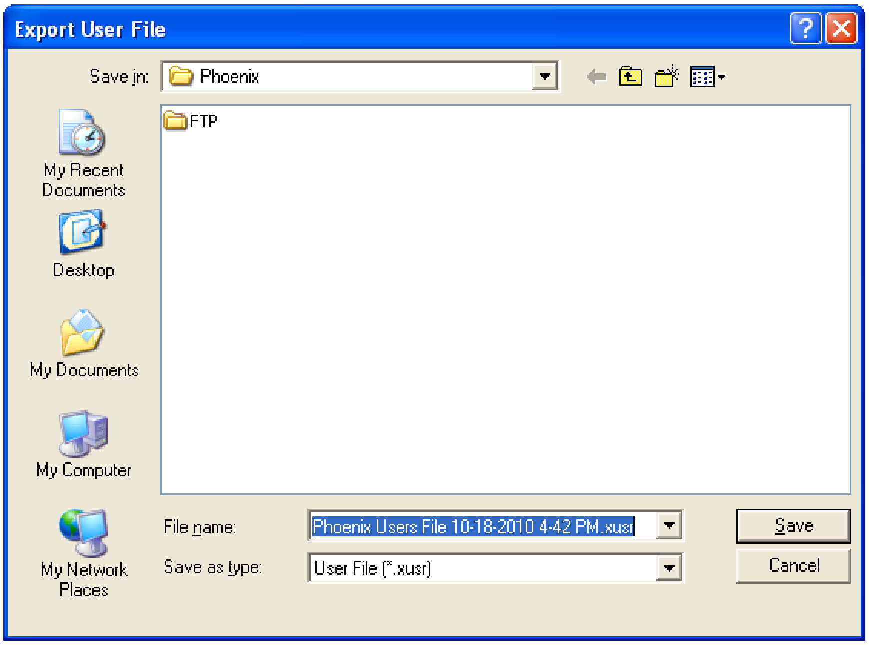
1. Select **Tools** → **Users** → **User Administration...**. The *User Administration* window appears, displaying a list of current users and their role levels.

Figure 7-8. The User Administration window



2. Click **Export File**. The *Export User File* window displays.

Figure 7-9. The Export User File window



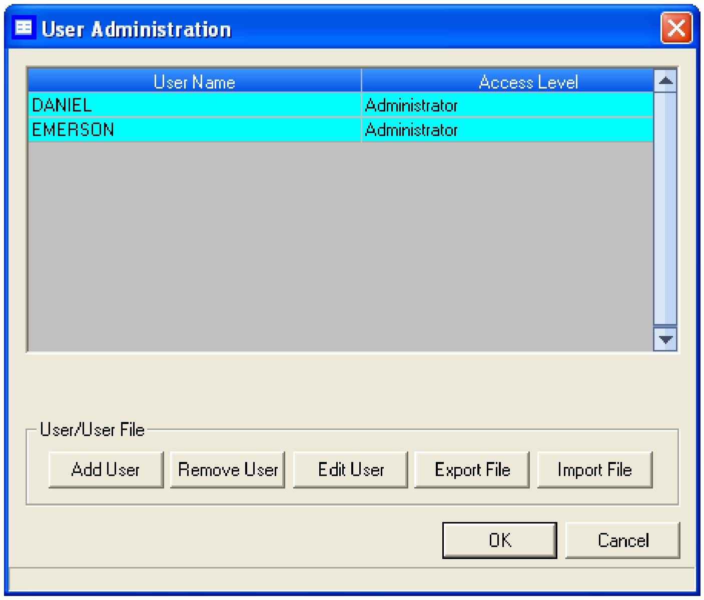
3. Navigate to where you want to save the file, if necessary.
4. Type in a file name or use the pre-generated name provided.
5. Click **Save**.

7.3.3 Importing a list of user profiles

To load a list of users, along with their role levels and passwords, do the following:

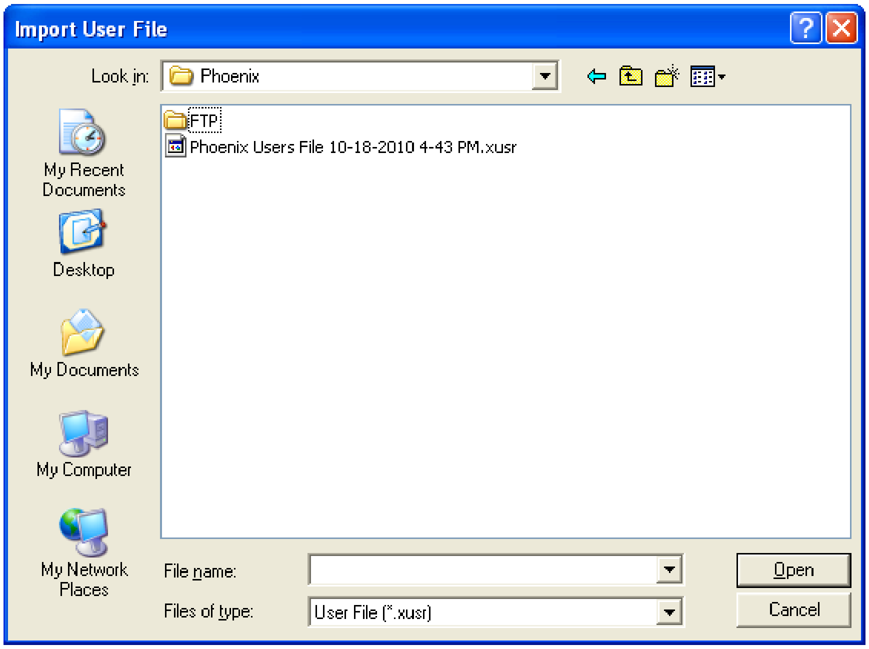
1. Select **Tools** → **Users** → **User Administration...**. The *User Administration* window appears, displaying a list of current users and their role levels.

Figure 7-10. The User Administration window



2. Click **Import File**. The *Import User File* window displays.

Figure 7-11. The Import User File window



3. Navigate to where the file is located, if necessary.

Note
User files have the **.xusr** extension.

4. Click on the file to be loaded.
5. Click **Open**. The users will be added to the *User Administration* window.

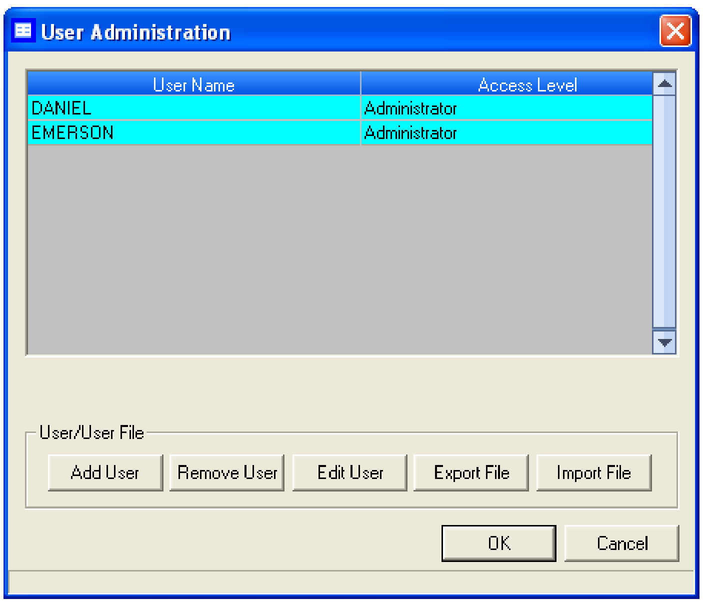
7.3.4 Editing users

Note
You must be logged in as an administrator.

To edit a user's name, role level or password, do the following:

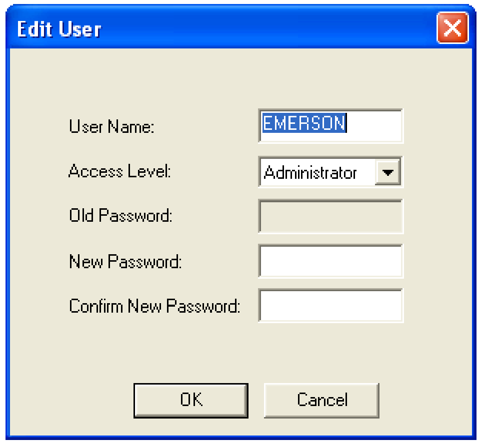
1. Select **Tools** → **Users** → **User Administration...**. The *User Administration* window appears, displaying a list of current users and their role levels.

Figure 7-12. The User Administration window



2. Select the user whose role you want to edit and click **Edit User**. The *Edit User* window displays.

Figure 7-13. The Edit User window



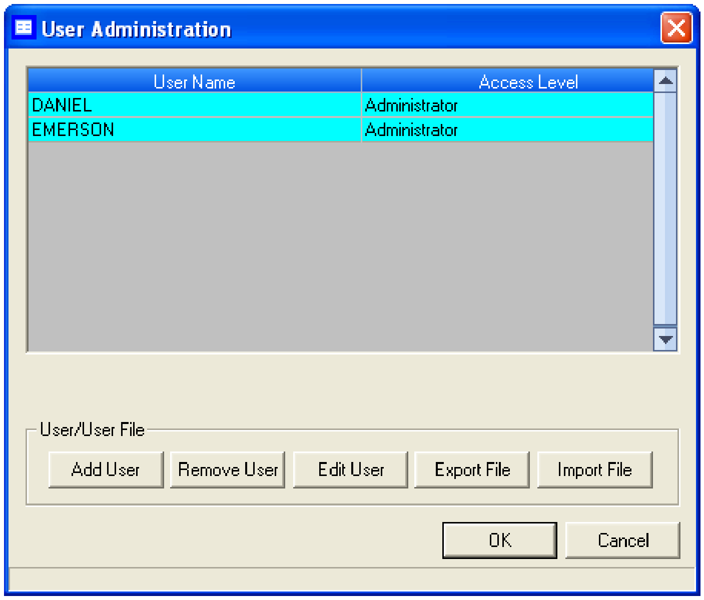
3. Change the appropriate information as required.
4. Click **OK**. MON 20/20 makes the requested changes and returns to the *User Administration* window.

7.3.5 Removing a user

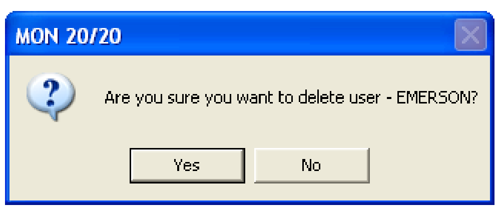
To remove a user, do the following:

1. Select **Tools** → **Users** → **User Administration....** The *User Administration* window appears, displaying a list of current users and their role levels.

Figure 7-14. The User Administration window



2. Select the user you want to delete and click **Remove User**. A confirmation message displays.



3. Click **Yes**. MON 20/20 deletes the user and returns to the *User Administration* window.

7.3.6 Changing a user's password

A user without administrator-level access can only change his or her password.

1. Select Select **Tools** → **Users** → **Change User Password...**. The *Change User Password* window displays.

Figure 7-15. The Change User Password window

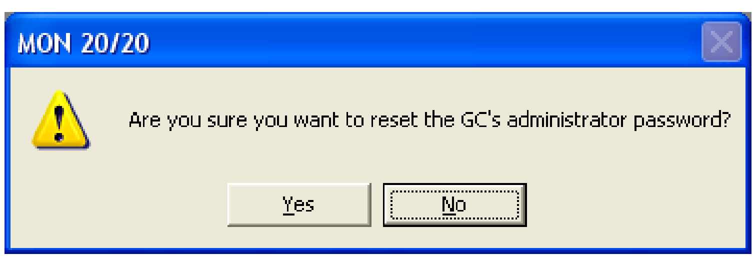
2. Enter the appropriate information in the text fields and click **OK**.

7.3.7 Resetting the adminstrator password

To reset an administrator password, do the following:

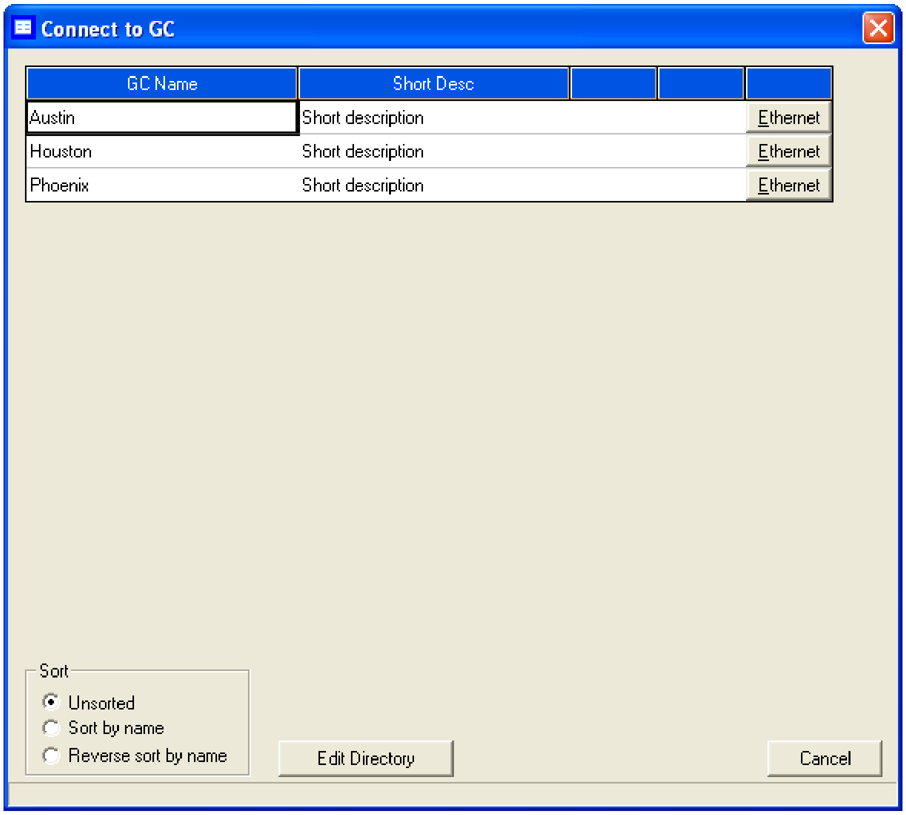
1. Start MON 20/20 and select **Users** → **Reset Administrator User / Password**. The following warning displays:

Figure 7-16. Password reset warning message



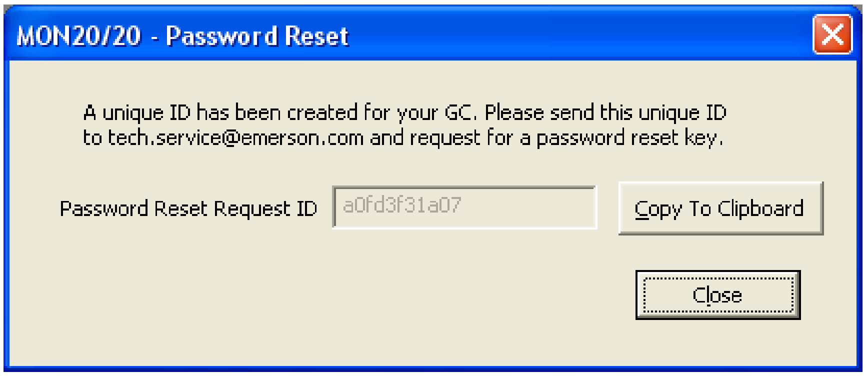
2. Click **Yes**. The *Connect to GC* window displays.

Figure 7-17. The Connect to GC window



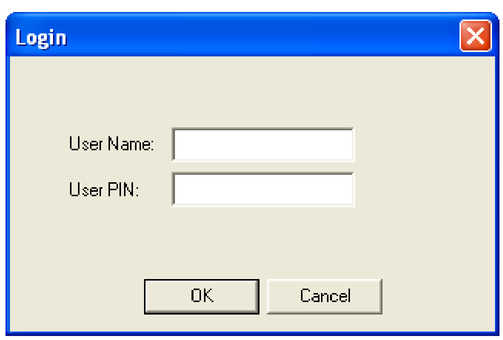
3. Click the **Ethernet** button that corresponds to the GC whose password you want to reset. MON 20/20 will connect to the GC and generate a Password Reset Request ID. The *MON 20/20 - Password Reset* window displays.

Figure 7-18. The MON 20/20 - Password Reset window



4. Click **Copy to Clipboard** and email the Password Reset Request ID to **tech.service@emerson.com**. You will be sent a Password Reset Key.
5. After you receive the Password Reset Key, return to the Connect to GC window and again click the **Ethernet** button that corresponds to the GC whose password you want to reset. The Login window displays.

Figure 7-19. Login window

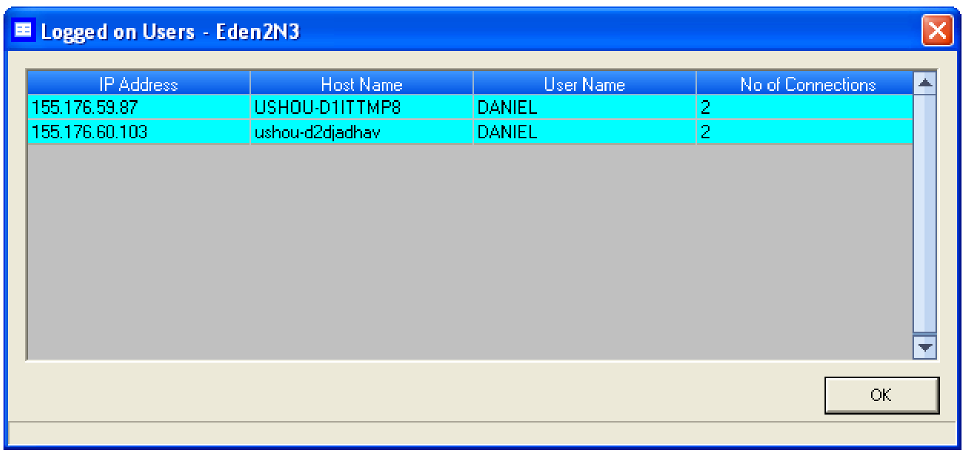


6. Enter the User Name and the Password Reset Key and click **OK**. MON 20/20 will connect to the GC. To change the Password Reset Key, see "Changing a user's password" on page 7-28.

7.3.8 Finding out who is connected to the gas chromatograph

To ascertain which users are connect to the GC, select **Tools** → **Users** → **Logged on Users...**. The *Logged on Users* window displays with a list of the users who are currently logged on to the GC, along with each user's IP address.

Figure 7-20. The Logged on Users window



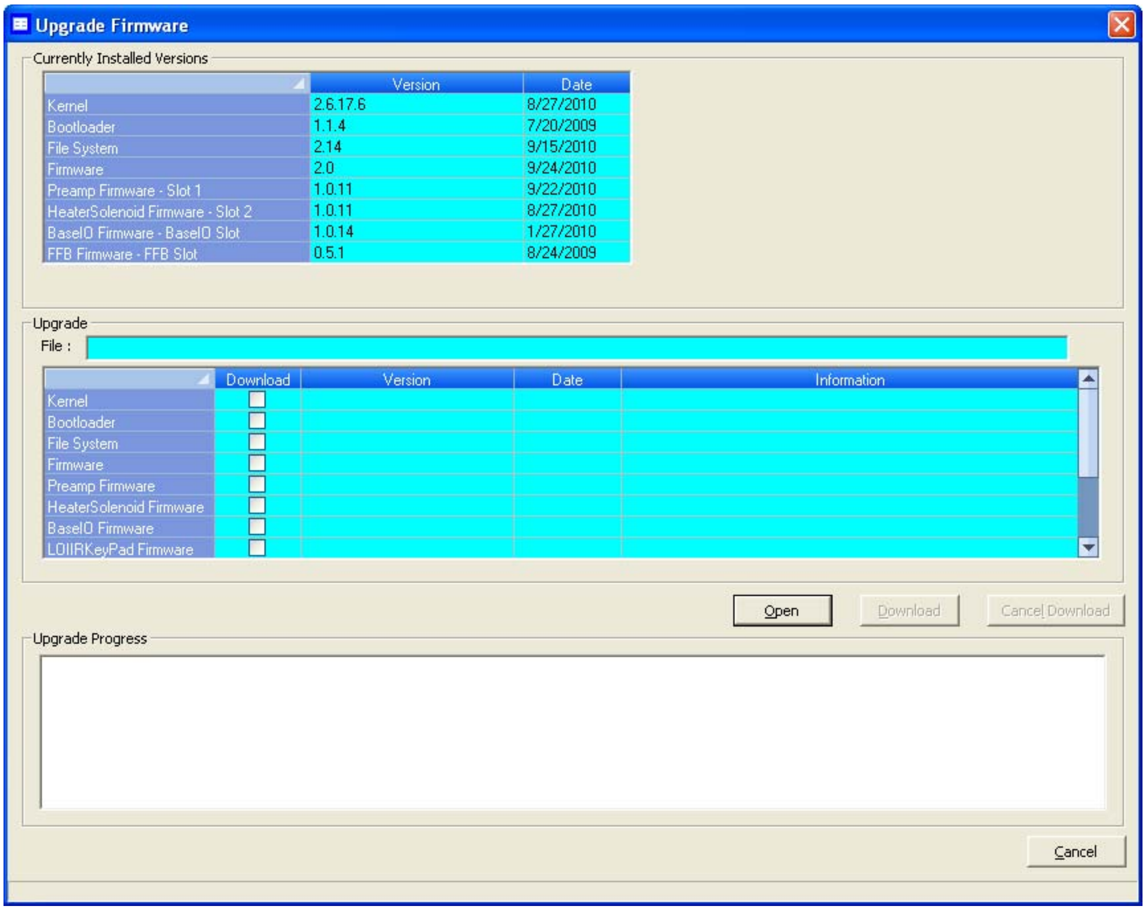
7.4 Upgrading the firmware

This command allows you to download upgrades to the GC's firmware.

To download an upgrade, do the following:

1. Select **Upgrade Firmware...** from the **Tools** menu. The *Upgrade Firmware* window displays. The Currently Install Versions section details the status of the currently-installed applications.

Figure 7-21. The Upgrade Firmware window

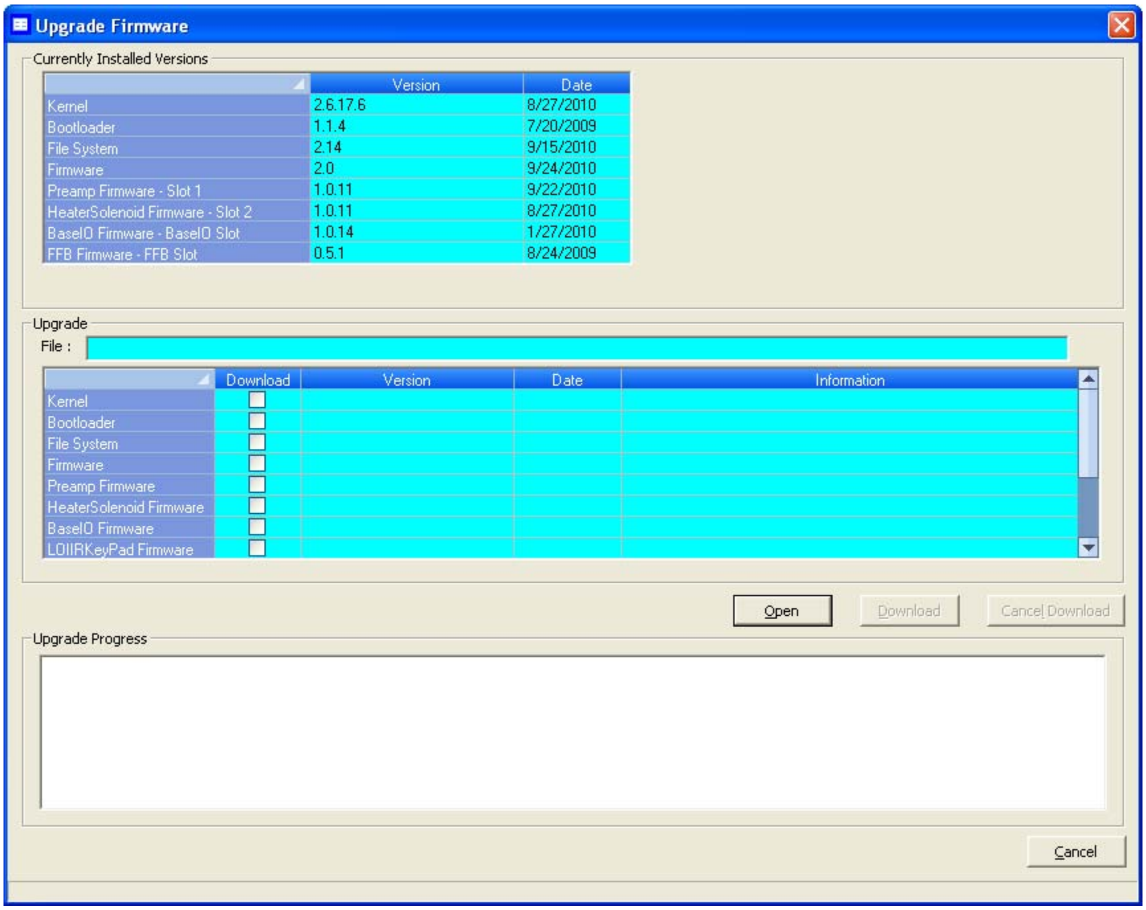


2. Click **Open**. The *Open Download File* dialog displays.
3. Locate and select the desired .zip file and click **Open**. The .zip file's content information displays in the **Upgrade** section of the *Upgrade Firmware* window. The *Information* column will alert you to the new files that should be selected and downloaded to the GC.

Note
If the upgrade file contains a program that is newer than what is currently installed on the GC, it will automatically be selected to downloading.

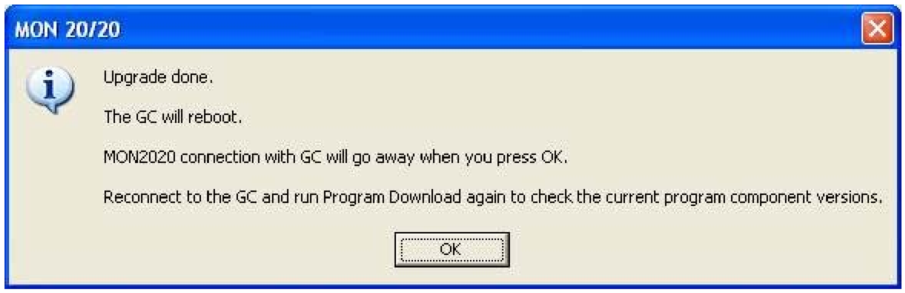
4. Select the check boxes for the files that you want to download to the GC and click **Download**. While the files are downloading, you can monitor their status in the **Upgrade Progress** section.

Figure 7-22. The Upgrade Firmware window



Note
If you want to halt the download, click Cancel Download.

5. When the download completes successfully, a confirmation message displays. Click **OK**. MON 20/20 disconnects from the GC and the GC reboots.



7.5 Cold booting

Cold booting the GC clears all its stored analysis files and logs and resets all the tables to the default settings. This is a necessary step towards refurbishing the GC or CPU board.

7.6 Viewing diagnostics

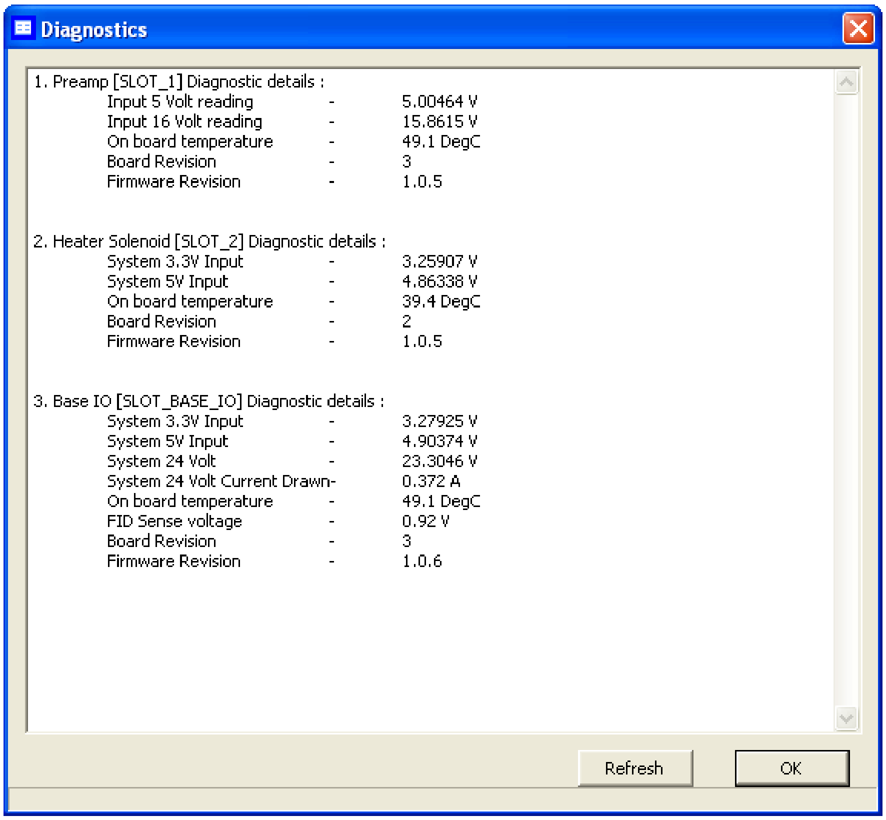
MON 20/20 provides a diagnostics window that displays vital statistics about the following software boards' revision and voltage levels:

- Preamp board
- Heater/Solenoid board
- Base IO board

This information can be useful when troubleshooting maintenance issues and in deciding if further action is required.

To view the *Diagnostics* window, select **Diagnostics...** from the **Tools** menu.

Figure 7-23. The Diagnostics window

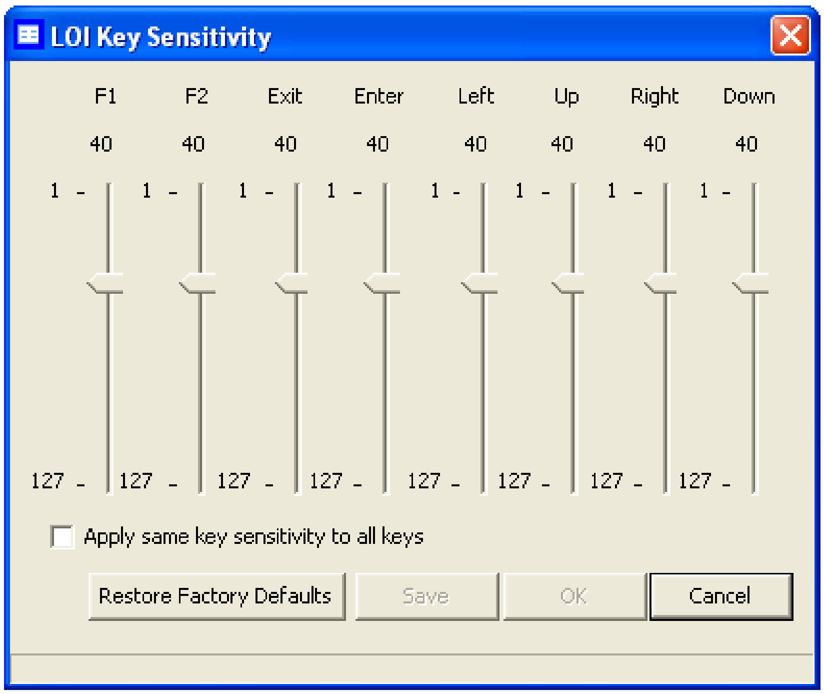


7.7 Adjusting the sensitivity of the LOI Keys

To adjust the sensitivity of the LOI keys, do the following:

1. Select **LOI Key Sensitivity** from the **Tools** menu. The *LOI Key Sensitivity* window displays.

Figure 7-24. The LOI Key Sensitivity window



2. Adjust the sensitivity for a key by sliding the bar up or down. Raising the bar *increases* the sensitivity or the key; lowering the bar *decreases* the sensitivity.

Note
To manipulate all of the sliders togethers, select the **Apply same key sensitivity to all keys** check box.

Note
Click **Restore Factory Defaults** to return the sliders to their original settings.

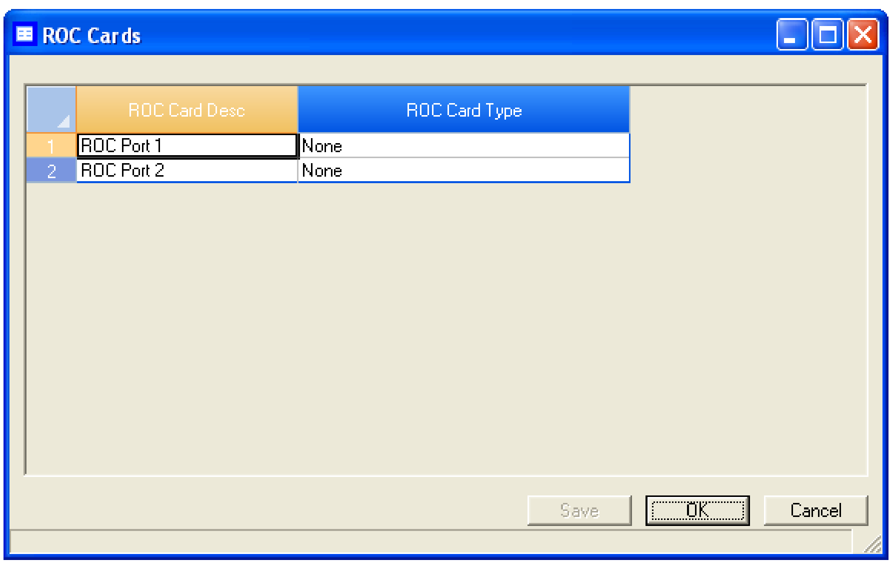
3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

7.8 Setting the ROC card type

To set the card type for a ROC card, do the following:

1. Select **ROC Cards...** from the **Tools** menu. The *ROC Cards* window displays.

Figure 7-25. The Roc Cards window



2. Select the card type for the ROC card from the *ROC Card Type* drop-down list. The options are:
   - None (Default)
   - ROC Analog Output
   - ROC Communication Module RS-232
   - ROC Communication Module RS-485
3. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

Appendix A, Component Data Table

This appendix provides a sample standard component data table as well as a table of the ISO-related components.

- Table A-1, Example Standard Component Data Table
- Table A-2, ISO Component Data Table

All values depend on a base pressure of 14.73 PSIA and a base temperature of 60 ^{o}F (15.56 ^{o}C).

BTU components reference *GPA Standard 2145-09*.

Note
An asterisk (*) denotes components that are assigned temporary I.D. codes, starting with 150, as they are used.

Table A-1 Example Standard Component Data Table

Component Name	Mol Wt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
Acetylene	26.04	0	0.899	0.615	0	0	1476.9	1426.5	Ethane	22
Air	28.9625	0	1	0.87586	7.3022	0.104759	0	0	AIRmix1	26
Argon	39.95	0	1.3792	0	0	0	0	0	Argon	46
Ammonia	17.03	212	0.588	0.6173	5.15	0.0874	435.4	359.8	None	*
Benzene	78.11	3.224	2.6969	0.8844	7.373	0.2798	3750.5	3599.2	n-Hexane	*
Butanes	58.1222	62.1055	2.0068	0.573515	4.78155	0.32117	3264.64	3012.45	n-Butane	33
Butene-1	56.11	63.05	1.9372	0.6013	5.013	0.2956	3087	2885.4	n-Butane	28
Butenes	56.11	55.448	1.9372	0.6097	5.0833	0.2916	3077.4	2875.73	n-Butane	32
1,2-Butadiene	54.09	20	1.8676	0.658	5.486	0.2604	2946.7	2795.5	n-Butane	35
1,3-Butadiene	54.09	60	1.8676	0.6272	5.229	0.2732	2886.6	2735.3	n-Butane	34
C3+	44.0956	188.62	1.5225	0.50719	4.2285	0.275429	2521.92	2320.36	Propane	47
C4+	58.1222	51.567	2.0068	0.5842	4.8706	0.315183	3269.85	3017.97	n-Butane	48
C4=1	56.11	63.05	1.9372	0.6013	5.013	0.2956	3087	2885.4	n-Butane	29
C5+	72.1488	15.576	2.4911	0.63071	5.2584	0.362396	4017.97	3715.58	n-Pentane	49
C6+ 47/35/17	95.9558	3.01891	3.31309	0.679907	5.66853	0.446214	5288.71	4900.62	C6mix1	08
C6+ 50/50/00	93.1887	3.29	3.21755	0.676145	5.63715	0.43619	5141.12	4762.99	C6mix2	09
C6+ Gpa 2261-99	93.1887	3.51579	3.21755	0.67556	5.63228	0.436267	5141.09	4762.99	C6mix3	10
C6+ 57/28/14	94.1904	3.37386	3.25214	0.677036	5.64458	0.439881	5194.53	4812.82	C6mix4	11
Carbon Monoxide	28.01	0	0.9671	0.801	6.68	0	321.2	321.2	CO	15
Carbon Dioxide	44.0095	0	1.5195	0.81716	6.8129	0.170618	0	0	CO2	17
Cis-2-Butene	56.11	45.54	1.9372	0.6271	5.228	0.2835	3079.3	2877.6	n-Butane	31

Table A-1 Example Standard Component Data Table (Continued)

Component Name	Mol Wt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
COS	60.08	0	0	0	0	0	0	0	None	42
CS2	76.14	0	2.6298	0	0	0	1267	1267	None	41
Cyclohexane	84.16	3.264	2.9057	0.7834	6.531	0.3403	4492.1	4189.4	n-Hexane	*
Cyclopentane	70.14	9.914	2.4215	0.7504	6.256	0.2961	3772.4	3520.2	n-Pentane	*
Diisobutyl	114.23	1.101	3.9439	0.6979	5.819	0.5185	6247.9	5793.9	n-Octane	*
2,3-Dimethbutan	86.18	7.404	2.9753	0.6664	5.556	0.4096	4756	4403.1	n-Hexane	*
2,2-Dimethpenta	100.21	3.492	3.4596	0.6782	5.654	0.4682	5494.6	5091.4	n-Heptane	*
2,4-Dimethpenta	100.21	3.292	3.4596	0.6773	5.647	0.4686	5499.4	5096	n-Heptane	*
3,3-Dimethpenta	100.2	2.773	3.4596	0.6976	5.816	0.455	5501.5	5098.2	n-Heptane	*
Ethane	30.069	800	1.0382	0.35628	2.9704	0.267369	1773.79	1622.75	Ethane	01
Ethyl Alcohol	46.07	2.3	1.5906	0.794	6.62	0.1839	1602.8	1451.5	None	*
Ethylbenzene	106.17	0.371	3.6655	0.8718	7.268	0.3858	5234.3	4982	n-Octane	*
Ethylene	28.0532	0	0.9686	0	0	0	1603.4	1502.47	Ethane	21
Ethylene Oxide	44.05	0	1.49	0	0	0	1459.4	1410.2	None	36
3-Ethylpentane	100.21	2.012	3.4596	0.7028	5.859	0.4517	5513.4	5110.1	n-Heptane	*
H2S	34.0809	395	1.1767	0.79886	6.6602	0.135156	638.57	588.15	H2S	40
HCL	36.46	925	1.2588	0.8558	7.135	0.1349	0	0	None	*
Helium	4.0026	0	0.1382	0.12486	1.041	0.101559	0	0	Helium	13
Hydrogen	2.02	0	0.0696	0.07	0	0	325	274.4	Hydrogen	12
i-Butane	58.1222	72.644	2.0068	0.56283	4.6925	0.327158	3259.42	3006.94	i-Butane	03
i-Butene	56.11	63.4	1.9372	0.6004	5.006	0.296	3068.2	2866.5	n-Butane	27
i-Pentane	72.1488	20.474	2.4911	0.62514	5.212	0.365621	4010.16	3707.56	i-Pentane	05

Table A-1 Example Standard Component Data Table (Continued)

Component Name	Mol Wt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
i-Propylbenzene	120.19	0.188	4.1498	0.8663	7.223	0.4396	5976.6	5674	n-Nonane	*
i-Octane	114.23	1.708	3.9439	0.6962	5.804	0.5199	6246.1	5792.2	n-Octane	*
Methane	16.0425	5000	0.5539	0.3	2.5	0.169487	1012.34	911.5	Methane	00
Methyl Alcohol	32.04	4.63	1.1063	0.796	6.64	0.1275	868.7	767.9	None	*
Methylcyclo C5	84.16	4.503	2.9057	0.7536	6.283	0.3538	4511.6	4209.1	n-Hexane	*
Methylcyclo C6	98.19	1.609	3.39	0.774	6.453	0.4019	5228	4874.9	n-Heptane	*
2-Methylhexane	100.21	2.271	3.4596	0.683	5.694	0.4647	5507.3	5104	n-Heptane	*
3-Methylhexane	100.21	2.13	3.4596	0.6917	5.767	0.4589	5511.3	5107.8	n-Heptane	*
m-Xylene	106.17	0.326	3.6655	0.8687	7.243	0.3871	5219.9	4967.8	n-Octane	*
n-Butane	58.1222	51.567	2.0068	0.5842	4.8706	0.315183	3269.85	3017.97	n-Butane	04
n-Decane	142.2817	0.06148	4.9126	0.73458	6.1244	0.613636	7760.81	7206.63	n-Decane	*
n-Heptane	100.2019	1.619	3.4597	0.68823	5.7379	0.461258	5515.33	5111.8	n-Heptane	45
n-Hexane	86.1754	4.961	2.9754	0.66406	5.5364	0.411121	4766.9	4414.19	n-Hexane	39
n-Nonane	128.2551	0.1809	4.4283	0.72224	6.0215	0.562592	7012.49	6508.02	n-Nonane	38
n-Octane	114.2285	0.5349	3.944	0.70655	5.8907	0.512168	6263.46	5809.41	n-Octane	20
n-Pentane	72.1488	15.576	2.4911	0.63071	5.2584	0.362396	4017.97	3715.58	n-Pentane	06
Neohexane	86.18	9.856	2.9753	0.654	5.453	0.4175	4747.2	4394.1	n-Hexane	*
Neopentane	72.15	35.9	2.4911	0.5967	4.975	0.383	3993.9	3691.4	i-Pentane	07
Nitrogen	28.0134	0	0.9672	0.80687	6.7271	0.10999	0	0	Nitrogen	14
NO2	46	0	0	0	0	0	0	0	None	19
NO	30.01	0	0	0	0	0	0	0	None	*
N2O	44.02	0	0	0	0	0	0	0	None	18

Table A-1 Example Standard Component Data Table (Continued)

Component Name	Mol Wt	Reid Vapor	Rel Dens Gas	Rel Dens Liquid	Lb/Gal	GPM Factor	Gross Dry BTU	Net Dry BTU	AGA 8 Component	Daniel Sim 2251 I.D. No.
o-Xylene	106.2	0.264	3.6655	0.8848	7.377	0.3801	5222	4969.7	n-Octane	*
Oxygen	31.9988	0	1.1048	1.1423	9.5238	0.088739	0	0	Oxygen	16
1-Pentene	70.14	19.115	2.4215	0.6457	5.383	0.3441	3835.4	3583.3	n-Pentane	37
Propane	44.0956	188.62	1.5225	0.50719	4.2285	0.275429	2521.92	2320.36	Propane	02
Propadiene	40.07	0	1.411	0	0	0	2254.2	2254.2	Propane	24
Propylene	42.0797	227.3	1.4529	0.5226	4.3571	0.255087	2338.4	2187.05	Propane	23
Propyne	40.07	0	1.411	0	0	0	2246.2	2246.2	Propane	25
p-Xylene	106.17	0.342	3.6655	0.8657	7.218	0.3885	5220.8	4968.6	n-Octane	*
Sulfur Dioxide	64.06	88	2.2117	1.397	11.65	0.1453	0	0	CO2	43
Styrene	104.15	0.24	3.5959	0.911	7.595	0.3622	5042.7	4841	n-Octane	*
Toluene	92.14	1.032	3.1812	0.8718	7.268	0.3348	4485.4	4283.5	n-Heptane	*
Trans-2-Butene	56.11	49.8	1.9372	0.61	5.086	0.2914	3075.1	2873.4	n-Butane	30
Triptane	100.21	3.374	3.4596	0.6946	5.791	0.4571	5496.2	5093	n-Heptane	*
Water	18.0153	0.9505	0.62202	1	8.3372	0.057072	50.43	0	Water	44

Table A-2 ISO Component Data Table

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Acetylene	26.038	0.0949	0.0837	0.0837	1301.86	1301.37	1301.21	1301.05	1256.79	1256.94	1256.98	1257.03
Air	28.9625	0	0	0	0	0	0	0	0	0	0	0
Argon	39.948	0.0316	0.0283	0.0265	0	0	0	0	0	0	0	0
Ammonia	17.0306	0.1225	0.1095	0.1049	384.57	383.51	383.16	382.81	316.96	316.86	316.82	316.79
Benzene	78.114	0.3017	0.272	0.253	3305.03	3302.86	3302.15	3301.43	3169.81	3169.56	3169.48	3169.38
Butanes	58.1222	0.2059	0.183	0.1743	2879.01	2875.17	2873.98	2872.8	2653.64	2653.01	2652.86	2652.72
Butene-1	56.108	0.1871	0.1732	0.1673	2721.55	2718.7	2717.75	2716.82	2541.25	2540.97	2540.86	2540.76
Butenes	56.108	0.1923	0.176	0.1717	2713.09	2710.23	2709.31	2708.36	2532.79	2532.49	2532.42	2532.27
1,2-Butadiene	54.092	0.2121	0.1924	0.1871	2597.13	2595.12	2594.45	2593.79	2461.91	2461.82	2461.78	2461.74
1,3-Butadiene	54.092	0.1844	0.1703	0.1643	2544.13	2542.1	2541.43	2540.77	2408.91	2408.8	2408.76	2408.72
C3+	44.0956	0.1682	0.1534	0.147	2461.51	2458.25	2457.23	2456.16	2264.71	2264.52	2264.38	2264.25
C4+	58.1222	0.2281	0.2049	0.1947	3081.63	3077.47	3076.32	3074.97	2841.63	2841.98	2841.83	2841.68
C4=1	56.108	0.1871	0.1732	0.1673	2721.55	2718.7	2717.75	2716.82	2541.25	2540.97	2540.86	2540.76
C5+	72.1488	0.2999	0.2651	0.2505	3754.2	3749.68	3748.71	3746.71	3464.63	3468.87	3468.75	3468.52
C6+ 47/35/17	95.9558	0.389	0.3459	0.3331	4663.16	4657.69	4655.86	4654.08	4316.22	4315.67	4315.46	4315.27
C6+ 50/50/00	93.1887	0.3704	0.3305	0.3183	4533.05	4527.71	4525.93	4524.19	4194.99	4194.46	4194.25	4194.07
C6+ GPA 2261-99	93.1887	0.3943	0.3503	0.3373	4697.93	4692.42	4690.58	4688.78	4348.61	4348.06	4347.84	4347.66
C6+ 57/28/14	94.1904	0.3781	0.3367	0.3243	4580.15	4574.76	4572.96	4571.2	4238.87	4238.34	4238.12	4237.94
Carbon Monoxide	28.01	0.0265	0.0224	0.02	282.8	282.91	282.95	282.98	282.8	282.91	282.95	282.98
Carbon Dioxide	44.0095	0.0819	0.0748	0.0728	0	0	0	0	0	0	0	0
Cis-2-Butene	56.108	0.1975	0.1817	0.1761	2714.9	2711.9	2711	2710	2534.6	2534.2	2534.1	2533.9
COS	60.076	0.1225	0.114	0.1095	548.01	548.15	548.19	548.23	548.01	548.15	548.19	548.23

Table A-2 ISO Component Data Table

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
CS2	76.143	0.2145	0.1949	0.1871	1104.06	1104.32	1104.41	1104.49	1104.06	1104.32	1104.41	1104.49
Cyclohexane	84.161	0.3209	0.2864	0.2757	3960.67	3956.02	3954.47	3952.96	3690.23	3689.42	3689.13	3688.86
Cyclopentane	70.14	0.255	0.2302	0.2236	3326.14	3322.19	3320.88	3319.59	3100.77	3100.03	3099.76	3099.51
Diisobutyl	114.23	0	0	0	0	0	0	0	0	0	0	0
2,3-Dimethbutan	86.177	0.3	0.2739	0.2569	4193.63	4188.6	4186.93	4185.28	3878.11	3877.57	3877.36	3877.17
2,2-Dimethpenta	100.21	0	0	0	0	0	0	0	0	0	0	0
2,4-Dimethpenta	100.21	0	0	0	0	0	0	0	0	0	0	0
3,3-Dimethpenta	100.2	0	0	0	0	0	0	0	0	0	0	0
Ethane	30.069	0.1	0.0922	0.0894	1564.34	1562.14	1561.41	1560.69	1429.12	1428.84	1428.74	1428.64
Ethyl Alcohol	46.07	0	0	0	0	0	0	0	0	0	0	0
Ethylbenzene	106.167	0.4858	0.4207	0.4037	4613.14	4609.53	4608.32	4607.15	4387.77	4387.37	4387.2	4387.07
Ethylene	28.0532	0.0866	0.08	0.0775	1413.51	1412.11	1411.65	1411.18	1323.36	1323.24	1323.2	1323.15
Ethylene Oxide	44.05	0	0	0	0	0	0	0	0	0	0	0
3-Ethylpentane	100.21	0	0	0	0	0	0	0	0	0	0	0
H2S	34.0809	0.1	0.1	0.1	562.94	562.38	562.19	562.01	517.87	517.95	517.97	517.99
HCL	36.46	925	1.2588	0.8558	7.135	0.1349	0	0	0	0	0	0
Helium	4.0026	0.0006	0.0002	0	0	0	0	0	0	0	0	0
Hydrogen	2.0159	-0.004	-0.0048	-0.0051	286.63	286.15	285.99	285.83	241.56	241.72	241.76	241.81
i-Butane	58.1222	0.2049	0.1789	0.1703	2874.2	2870.58	2869.38	2868.2	2648.83	2648.42	2648.26	2648.12
i-Butene	56.108	0.1871	0.1703	0.1673	2704.8	2702	2701.1	2700.2	2524.5	2524.3	2524.2	2524.1
i-Pentane	72.1488	0.251	0.228	0.2168	3535.98	3531.68	3530.24	3528.83	3265.54	3265.08	3264.89	3264.73
i-Propylbenzene	120.19	0	0	0	0	0	0	0	0	0	0	0
i-Octane	114.23	0	0	0	0	0	0	0	0	0	0	0
Methane	16.0425	0.049	0.0447	0.0436	892.97	891.56	891.09	890.63	802.82	802.69	802.65	802.6

Table A-2 ISO Component Data Table

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Methyl Alcohol	32.042	0.4764	0.3578	0.3286	766.59	765.09	764.59	764.09	676.44	676.22	676.14	676.06
Methylcyclo C5	84.161	0.313	0.2811	0.2702	3977.04	3972.46	3970.93	3969.44	3705.34	3705.59	3705.86	3706.6
Methylcyclo C6	98.188	0.3808	0.3376	0.3256	4600.64	4602.35	4604.09	4609.34	4292.53	4292.78	4293.06	4293.82
2-Methylhexane	100.21	0	0	0	0	0	0	0	0	0	0	0
3-Methylhexane	100.21	0	0	0	0	0	0	0	0	0	0	0
m-Xylene	106.167	0	0	0	0	0	0	0	0	0	0	0
n-Butane	58.1222	0.2069	0.1871	0.1783	2883.82	2879.76	2878.57	2877.4	2658.45	2657.6	2657.45	2657.32
n-Decane	142.2817	0.7523	0.645	0.614	6842.69	6834.9	6832.31	6829.77	6346.88	6346.14	6345.85	6345.59
n-Heptane	100.2019	0.4123	0.3661	0.3521	4862.87	4857.18	4855.29	4853.43	4502.28	4501.72	4501.49	4501.3
n-Hexane	86.1754	0.3286	0.295	0.2846	4203.23	4198.24	4196.58	4194.95	3887.71	3887.21	3887.01	3886.84
n-Nonane	128.2551	0.6221	0.5385	0.5148	6182.91	6175.82	6173.46	6171.15	5732.17	5731.49	5731.22	5730.99
n-Octane	114.2285	0.5079	0.445	0.4278	5522.4	5516.01	5513.88	5511.8	5116.73	5116.11	5115.87	5115.66
n-Pentane	72.1488	0.2864	0.251	0.2345	3542.89	3538.6	3537.17	3535.77	3272.45	3272	3271.83	3271.67
Neohexane	86.177	0.2898	0.2627	0.255	4185.84	4180.83	4179.15	4177.52	3870.32	3869.8	3869.59	3869.41
Neopentane	72.15	0.2387	0.2121	0.2025	3521.72	3517.43	3516.01	3514.61	3251.28	3250.83	3250.67	3250.51
Nitrogen	28.0134	0.0224	0.0173	0.0173	0	0	0	0	0	0	0	0
NO2	46.0006	0	0	0	0	0	0	0	0	0	0	0
NO	30.006	0	0	0	0	0	0	0	0	0	0	0
N2O	44.02	0	0	0	0	0	0	0	0	0	0	0
o-Xylene	106.167	0.5128	0.4427	0.4231	4602.17	4598.64	4597.48	4596.31	4376.8	4376.48	4376.34	4376.23
Oxygen	31.9988	0.0316	0.0283	0.0265	0	0	0	0	0	0	0	0
1-Pentene	70.14	0.249	0.2258	0.2191	3381.29	3377.75	3376.57	3375.42	3155.92	3155.59	3155.45	3155.34
Propane	44.0956	0.1453	0.1338	0.1288	2224.01	2221.1	2220.13	2219.17	2043.71	2043.37	2043.23	2043.11
Propadiene	40.065	0.1414	0.1304	0.1265	1945.25	1943.96	1943.53	1943.11	1855.1	1855.09	1855.08	1855.08

Table A-2 ISO Component Data Table

Component Name	Molar Mass	Sum Factor (0°C)	Sum Factor (15°C)	Sum Factor (20°C)	CV Sup kJ/Mol (0°C)	CV Sup kJ/Mol (15°C)	CV Sup kJ/Mol (20°C)	CV Sup kJ/Mol (25°C)	CV Inf kJ/Mol (0°C)	CV Inf kJ/Mol (15°C)	CV Inf kJ/Mol (20°C)	CV Inf kJ/Mol (25°C)
Propylene	42.0797	0.1378	0.1265	0.1225	2061.57	2059.43	2058.72	2058.02	1926.35	1926.13	1926.05	1925.97
Propyne	40.065	0	0	0	0	0	0	0	0	0	0	0
p-Xylene	106.167	0	0	0	0	0	0	0	0	0	0	0
Sulfur Dioxide	64.065	0.1549	0.1449	0.1414	0	0	0	0	0	0	0	0
Styrene	104.15	0	0	0	0	0	0	0	0	0	0	0
Toluene	92.141	0.3886	0.3421	0.3286	3952.72	3949.81	3948.84	3947.89	3772.42	3772.08	3771.95	3771.83
Trans-2-Butene	56.108	0.1975	0.1789	0.1761	2711.1	2708.3	2707.4	2706.4	2530.8	2530.5	2530.5	2530.3
Triptane	100.21	0	0	0	0	0	0	0	0	0	0	0
Water	18.0153	0.2646	0.2345	0.2191	45.074	44.433	44.224	44.016	0	0	0	0

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Appendix B, Data computations

B.1 Data acquisition

Every second, exactly 50 equally-spaced data samples are taken (i.e., one data sample every 20 milliseconds) for analysis by the controller assembly.

As a part of the data acquisition process, groups of incoming data samples are averaged together before the result is stored for processing. Non-overlapping groups of *N* samples are averaged and stored, and thus reduce the effective incoming data rate to 40/*N* samples per second. For example, if *N* = 5, then a total of 40/5 or 6 (averaged) data samples are stored every second.

The value for the variable *N* is determined by the selection of a Peak Width parameter (*PW*). The relationship is:

$$N = PW$$

where *PW* is given in seconds. Allowable values of *N* are 1 to 63; this range corresponds to *PW* values of 2 to 63 seconds.

The variable *N* is known as the integration factor. This term is used because *N* determines how many points are averaged, or integrated, to form a single value. The integration of data upon input, before storing, serves two purposes:

- The statistical noise on the input signal is reduced by the square root of *N*. In the case of N = 4, a noise reduction of two would be realized.
- The integration factor controls the bandwidth of the chromatograph signal. It is necessary to match the bandwidth of the input signal to that of the analysis algorithms in the controller assembly. This prevents small, short-duration perturbations from being recognized as true peaks by the program. It is therefore important to choose a Peak Width that corresponds to the narrowest peak in the group under consideration.

B.2 Peak detection

For normal area or peak height concentration evaluation, the determination of a peak's start point and end point is automatic. The manual determination of start and end points is used only for area calculations in the Forced Integration mode. Automatic determination of peak onset or start is initiated whenever Integrate Inhibit is turned off. Analysis is started in a region of signal quiescence and stability, such that the signal level and activity can be considered as baseline values.

Note
The controller assembly software assumes that a region of signal quiescence and stability will exist.

Having initiated a peak search by turning Integrate Inhibit off, the controller assembly performs a point by point examination of the signal slope. This is achieved by using a digital slope detection filter, a combination low pass filter and differentiator. The output is continually compared to a user-defined system constant called Slope Sensitivity. A default value of 8 is assumed if no entry is made. Lower values make peak onset detection more sensitive, and higher values make detection less sensitive. Higher values (20 to 100) would be appropriate for noisy signals, e.g. high amplifier gain.

Onset is defined where the detector output exceeds the baseline constant, but peak termination is defined where the detector output is less than the same constant.

Sequences of fused peaks are also automatically handled. This is done by testing each termination point to see if the region immediately following it satisfies the criteria of a baseline. A baseline region must have a slope detector value less than the magnitude of the baseline constant for a number of sequential points. When a baseline region is found, this terminates a sequence of peaks.

A zero reference line for peak height and area determination is established by extending a line from the point of the onset of the peak sequence to the point of the termination. The values of these two points are found by averaging the four integrated points just prior to the onset point and just after the termination points, respectively.

The zero reference line will, in general, be non-horizontal, and thus compensates for any linear drift in the system from the time the peak sequence starts until it ends.

In a single peak situation, peak area is the area of the component peak between the curve and the zero reference line. The peak height is the distance from the zero reference line to the maximum point on the component curve. The value and location of the maximum point is determined from quadratic interpolation through the three highest points at the peak of the discrete valued curve stored in the controller assembly.

For fused peak sequences, this interpolation technique is used both for peaks, as well as, valleys (minimum points). In the latter case, lines are dropped from the interpolated valley points to the zero reference line to partition the fused peak areas into individual peaks.

The use of quadratic interpolation improves both area and height calculation accuracy and eliminates the effects of variations in the integration factor on these calculations.

For calibration, the controller assembly may average several analyses of the calibration stream.

B.3 Analysis computations

There are two basic analysis algorithms included in the GC:

- Area Analysis – calculates area under component peak
- Peak Height Analysis – measures height of component peak

B.3.1 Concentration analysis with response factor

Calibration

The concentration calculations discussed as follows require a unique response factor for each component in an analysis. These factors may be manually entered by an operator or automatically calculated by calibrating the system.

$$ARF_n = \frac{Area_n}{Cal_n} \quad \text{or} \quad HRF_n = \frac{Ht_n}{Cal_n}$$

where

ARF_n	Area response factor for component n in area per mole percent (%).
HRF_n	Height response factor for component n.
$Area_n$	Area associated with component n in calibration gas.
Ht_n	Height associated with component n in mole percent in calibration gas.
Cal_n	Amount of component n in mole percent of calibration gas.

Calculated response factors are stored by the GC for use in the concentration calculations, and are printed out in the configuration and calibration reports.

$$RFAVG_n = \frac{\sum_{i=1}^{k} RF_i}{k}$$

where

$RFAVG_n$	Area or height average response factor for component n.
RF_i	Area or height response factor for component n from the calibration run.
k	Number of calibration runs actually used to calculate the response factors.

The percent deviation of new RF average from old RF average is calculated in the following manner:

$$deviation = \left[\frac{RF_{new} - RF_{old}}{RF_{old}} \times 100\right]$$

where the absolute value of percent deviation for alarm has been previously entered by the operator.

Calculation in mole percent w/o normalization

Once response factors have been determined by the controller or entered by the operator, component concentrations are determined for each analysis using the following equations:

$$CONC_n = \frac{Area_n}{ARF_n} \quad \text{or} \quad CONC_n = \frac{Ht_n}{HRF_n}$$

where

$CONC_n$	Concentration of component n in mole percent.
$AREA_n$	Area of component n in unknown sample.
ARF_n	Response factor of component n calculated from area of calibration sample. Units are area per mole percent.
Ht_n	Peak height of component n in unknown sample.
HRF_n	Response factor of component n calculated from peak height of calibration sample. Units are height per mole percent.

Note that the average concentration of each component will also be calculated when data averaging is requested.

Component concentrations may be input through analog inputs 1 to 4 or may be fixed. If a fixed value is used, the calibration for that component is the mole percent that will be used for all analyses:.

$$CONCN_n = \frac{CONC_n}{\sum_{i=1}^{k} CONC_i} \times 100$$

where

$CONCN_n$	Normalized concentration of component n in percent of total gas concentration.
$CONC_n$	Non-normalized concentration of component n in mole percent.
$CONC_i$	Non-normalized concentration (in mole percent) from each of the k components to be grouped into this normalization.
k	Number of components to be included in the normalization.

B.4 Post analysis computations

B.4.1 Liquid equivalent computations

The equivalent liquid volume, in gallons per 1000 standard cubic feet (GPM) is given by:

$$GPM_n = CONCN_n \times LCF_n \times \frac{BASEPRS}{14.73} \times \frac{BASETEMP + 459.67}{60 + 459.67}$$

where

GPM_n	Gallons/1000 standard cubic feet of component n.
$CONCN_n$	Normalized (if selected) concentration of component n.
LCF_n	Liquid equivalent conversion factor for component n at 14.73 PSIA and 60 degrees F.
BASE PRS	Base (contact) Pressure specified; defaults to 14.73.

B.4.2 Heating value calculations

- Dry Gross BTU of Total Gas

$$DRYBTU|CF = \frac{\sum_{n=1}^{P} [(CONCN)_n (BTU|CF)_n]}{100}$$

where

DRYBTU/CF	Uncorrected dry BTU content per cubic foot of total gas sample.
$CONCN_n$	Normalized (if selected) concentration of component n, calculated from peak analysis.
BTU/CF_n	Energy content per cubic foot of component n, stored in permanent memory.
P	Total number of components to be used in calculation of total BTU/CF.
100	Removed the 100 factored into the calculation of the concentration earlier in the analysis.

- Ideal Gas Relative Density

$$TOTALRD = \frac{\sum_{n=1}^{P} CONC_n (RD_n)}{100}$$

where

RD_n	Relative Density of component "n"
TOTAL RD	Relative Density of total gas sample
$CONCN_n$	Normalized (if selected) concentration of component *n*, calculated from peak analysis.
P	Total number of components to be used in calculation of total BTU/CF.
100	Removed the 100 factored into the calculation of the concentration earlier in the analysis.

- Real (corrected) Gas Relative Density

  The Ideal Gas Relative Density, D_I, is corrected to the Real Gas Relative Density, D_R, by dividing by the compressibility factor, *Z*, for gas mixture at 60 ^{o}F and one atmosphere pressure and multiplying by the compressibility factor of air at the same conditions:

$$D_R = \frac{D_I Z_{b(air)}}{Z_{b(gas)}}$$

where

D_I	Ideal Gas Relative Density. See Appendix A for more information.
$Z_{b(air)}$	Compressibility factor of air, or 0.99959.
$Z_{b(gas)}$	Compressibility factor of gas mixture.

- Compressibility Factor Dry BTU

  Compressibility equations use calculations from the American Gas Association's *Compressibility Factors of Natural Gas and Other Related Hydrocarbon Gases: AGA Report #8.*

$$CORRDRYBTU = \frac{DRYBTU}{Z}$$

where

DRYBTU	Dry Gross BTU of Total Gas; see page 7 for details.
Z	Compressibility factor.
BASE PRS	Base (contract) pressure specified; defaults to 14.73 PSIA.

- Corrected Saturated BTU

$$CORRSATBTU = \frac{(DRYBTU)(0.9826)}{Z}$$

where

DRYBTU	Dry Gross BTU of Total Gas; see page 7 for details.
CORRSATBTU	Corrected saturated BTU content per cubic foot of total gas sample at base conditions of BASE PRS and 60 °F.
Z	Compressibility Factor Dry BTU; see page 8 for details.
BASEPRS	Base (contract) pressure specified; defaults to 14.73 PSIA.

- Compressibility and Base Pressure

Compressibility and base pressure corrections for Dry BTU are:

$$CorrDryBTU = \left(\frac{DryBTUatBasePressure}{Z}\right)\left(\frac{ContractPressure}{BasePressure}\right)$$

where

CORRDRYBTU	Dry Gross BTU of Total Gas; see page 7 for details.
Z	Compressibility Factor Dry BTU; see page 8 for details.
BASE PRESSURE	Base (contract) pressure specified; defaults to 14.73 PSIA

- BTU Calculations

Note that the BTU calculations apply to Gross dry, saturated, actual BTU and Net dry, saturated, and actual BTU

$$GrossActualBTU(corr) = GrossDryBTU(corr) \times \left(100 - \frac{(WVC)}{100}\right)$$

where

WVC	Water volume content provided by a "live analog input".

$$WI = \frac{CORR(GROSS)BTU}{\sqrt{RD}}$$

where

W.I.	Wobbe index value
CORRGROSSBTU	Corrected Dry BTU for Total Gas Sample; see page 8 for details.
RD	Real Relative Density; see page 8 for details.

Note
All components in the sample must be measured in order to calculate weight percent.

$$WTpercent_n = \frac{(CONC_n)(MW_n)}{\sum_{i=1}^{k} (CONC_i)(MW_i)} \times 100$$

where

$WTpercent_n$	Weight percent of component n.
$CONC_n$	Concentration in mole percent of component n.
Mw_n	Molecular weight of component n.
$\sum_{i=1}^{K}$	Sum of weights of all components in sample.

$$AVGMW = \sum_{i=1}^{k} (CONC_i)(MW_i)$$

where

AVGMW	Average molecular weight.
$\sum_{i=1}^{K}$	Sum of weights of all components in sample.

$$LVpercent = \frac{(WTpercent_n) \div (D_n)}{\sum_{i=1}^{k} (WTpercent_i) \div (D_i)} \times 100$$

Note
All components in the sample must be measured in order to calculate liquid volume from mole percent.

where

LV percent	Liquid volume.
WT percent	Weight percent.
D	Density.
$\sum_{i=1}^{K}$	Sum of all components in sample.

$$RVP = \frac{\sum_{i=1}^{k} (CONC_i)(VP_i)}{100}$$

where

RVP	Reid vapor pressure.
$CONC_i$	Normalized concentration of component *i* in mole percent.
VP_i	Vapor pressure at 100 degrees F of component *i* (GPA2145 = 94).

Note
All components in the sample must be measured in order to calculate LRDT.

$$LRD_T = \frac{\sum_{i=1}^{k} (LVpercent_i)(LRD_i)}{100}$$

where

LRD_T	Liquid Relative Density of sample, relative to water at 60 °F.
LRD_i	Liquid Relative Density of component i (GPA2145-94).
$LVpercent$	Liquid Volume Percent.

Note
All components in the sample must be measured in order to calculate liquid density.

$$LD_T = \frac{\sum_{i=1}^{k} (LV_i)(LD_i)}{100}$$

where

LD_T	Liquid Density of total sample in pounds per gallon
LD_i	Liquid Density of component i (GPA 2145-94).
LV_i	Liquid Volume Percent of component i.

$$GD = (RD)(76.4976)$$

where

GD	Gas Density in lb/1000 ft^3.
RD	Relative Density (relative to air).
76.4976	Density of air at 14.73 PSIA and 60 °F, in lb/1000 ft^3.

B.4.3 Multi-level calibration

The properties of each gas component can be viewed using the Component Data menu. Included with the component properties in the Component Data Table are four coefficients labeled Multi-Level Calib 'a', 'b', 'c', and 'd', for each component. If these parameters are all set to zero, then linear calibration is used. See Section B.3.1 for the Response Factor calculations.

If any of these parameters have a value other than zero, then multi-level, or polynomial calibration is used for that component.

The response factors are then calculated as:

$$ResponseFactor = \frac{aP^3 + bP^2 + cP + d}{CalibrationConcentration\ (mol\ \%)}$$

where

P	Peak size from average calibration runs.
Coefficients: *a*,*b*,*c*, and *d*	Calculated offline and entered after multi-level calibration using several--typically seven--calibration gases. **NOTE**: If the coefficient values are correct, the response factor will be close to 1.

The mole% value in the sample gas is then calculated as

$$Mole\ \% = \frac{aP^3 + bP^2 + cP + d}{responsefactor}$$

where

P	Peak size measured in sample gas.
Coefficients: *a*,*b*,*c*, and *d*	Calculated offline and entered after multi-level calibration using several--typically seven--calibration gases. **NOTE**: If the coefficient values are correct, the response factor will be close to 1.

B.4.4 Indirect calibration

Component gases that are *not* found in the calibration gas, but may be found in the sample gas, can be assigned a relative response factor that is a fixed multiple of a reference component that *is* found in the calibration gas.

The Relative Response Factors and Reference Component Values are included in the Component Data Table. See Appendix A for more information.

If the Reference Component is **None**, then normal (direct) calibration is used.

If the Reference Component is defined, (e.g. Propane) then the mole% value for the indirect component (e.g. neoC5), is calculated as:

$$mole\%\ (neoC5) = mole\%\ (Propane) \left(\frac{P(neoC5)}{P(Propane)}\right)(RRFneoC5)$$

where

P	Peak size
RRF	Relative Response Factor

Appendix C, Modbus registers list

There are two GC Modbus registers that may be of interest to the developer: SIM_2251 and User_Modbus. Differences betweeb the two registers are summarized in Table C-1.

Table C-1 Comparison of SIM_2251 and User_Modbus

SIM_2251	User_Modbus
Serial slave port.	Serial slave port.
Modified protocol that allows floating point numbers to be transmitted over Modbus via 2251 emulation slave type.	The standard Gould Modbus protocol that accommodates PLC Emulation LO-HI.
Nearly all register contents are predefined; a few 9000-series registers can be user-defined (i.e., read-write).	Boolean (coils) are predefined. Numeric (registers) are user-defined.
Variables assigned to registers can be listed in the GC Config Report. For instructions and an example report, see Section 5.12.	Variables assigned to registers can be listed in the GC Config Report. For instructions and an example report, see Section 5.12.
When using the Modbus Test program, set *Register Mode* to "DANIEL" to view register contents (see Section 7.1.2).	When using the Modbus Test software, set *Register Mode* to "PLC LH" to view register contents (see Section 7.1.2).

C.1 User_Modbus register list

Table C-2 lists only variables included in the User_Modbus Boolean Modbus registers. These registers are not user-defined and primarily contain alarm flags that may be useful for debugging purposes. To use the Modbus program to view the contents of these registers, you will need to set the *Function* parameter to **1 (Read Coil)**. See Section 7.1 for details on using the Modbus program.

All other User_Modbus registers can be defined by the user. To define User_Modbus register contents, see Section 4.12.3.

To obtain a complete list of register assignments, both SIM_2251 and User_Modbus, print a GC Config Report. See "Generating a GC Configuration Report" on page 5-65 for more information.

Table C-2 List of User_Modbus Registers

Slave Name **USER_MODBUS**					
Modbus Reg.	**Variable Name**	**Field Name**	**Indices S**	**C**	
Boolean (Coils)					
0	sysalarm_set		1	1	Application Checksum Failure
1	sysalarm_set		2	1	ROM Checksum Failure
2	sysalarm_set		3	1	RAM Diagnostics Failure
3	sysalarm_set		4	1	A/D Converter Failure
4	sysalarm_set		5	1	Detector Oven Failure
5	sysalarm_set		6	1	Liquid Sample Valve Heater Failure
6	sysalarm_set		7	1	Sample System Oven Failure
7	sysalarm_set		8	1	Catalytic Converter Failure
8	sysalarm_set		9	1	Heater 5 Failure
9	sysalarm_set		10	1	Heater 6 Failure
10	sysalarm_set		11	1	Heater 1 Controller Failure
11	sysalarm_set		12	1	Heater 2 Controller Failure
12	sysalarm_set		13	1	Heater 3 Controller Failure
13	sysalarm_set		14	1	Heater 4 Controller Failure
14	sysalarm_set		15	1	Heater 5 Controller Failure
15	sysalarm_set		16	1	Heater 6 Controller Failure
16	sysalarm_set		17	1	FID Flame out
17	sysalarm_set		18	1	Warmstart Calibration Failure
18	sysalarm_set		19	1	Valve Timing Failure
19	sysalarm_set		20	1	Excess Response Factor Deviation
20	sysalarm_set		21	1	M200 Invalid Non-Volatile Data
21	sysalarm_set		22	1	M200 Invalid A Module Data
22	sysalarm_set		23	1	M200 Invalid B Module Data
23	sysalarm_set		24	1	M200 Bad Options
24	sysalarm_set		25	1	M200 Stack Overflow

Table C-2 List of User_Modbus Registers

Slave Name **USER_MODBUS**					
Modbus Reg.	**Variable Name**	**Field Name**	**Indices S**	**C**	
Boolean (Coils)					
25	sysalarm_set		26	1	M200 Hardware Shutdown
26	sysalarm_set		27	1	M200 Synchronization Failure
27	sysalarm_set		28	1	Preamp Input 1 Out of Range - DET1
28	sysalarm_set		29	1	Preamp Input 2 Out of Range - DET1
29	sysalarm_set		30	1	Preamp Input 3 Out of Range - DET1
30	sysalarm_set		31	1	Preamp Input 4 Out of Range - DET1
31	sysalarm_set		32	1	Preamp Failure - DET1
32	sysalarm_set		33	1	Analog Output 1 HIGH
33	sysalarm_set		34	1	Analog Output 2 HIGH
34	sysalarm_set		35	1	Analog Output 3 HIGH
35	sysalarm_set		36	1	Analog Output 4 HIGH
36	sysalarm_set		37	1	Analog Output 5 HIGH
37	sysalarm_set		38	1	Analog Output 6 HIGH
38	sysalarm_set		39	1	Analog Output 7 HIGH
39	sysalarm_set		40	1	Analog Output 8 HIGH
40	sysalarm_set		41	1	Analog Output 9 HIGH
41	sysalarm_set		42	1	Analog Output 10 HIGH
42	sysalarm_set		43	1	Analog Output 11 HIGH
43	sysalarm_set		44	1	Analog Output 12 HIGH
44	sysalarm_set		45	1	Analog Output 13 HIGH
45	sysalarm_set		46	1	Analog Output 14 HIGH
46	sysalarm_set		47	1	Analog Output 15 HIGH
47	sysalarm_set		48	1	Analog Output 16 HIGH
48	sysalarm_set		49	1	Analog Output 1 LOW
49	sysalarm_set		50	1	Analog Output 2 LOW
50	sysalarm_set		51	1	Analog Output 3 LOW

Table C-2 List of User_Modbus Registers

Slave Name **USER_MODBUS**					
Modbus Reg.	**Variable Name**	**Field Name**	**Indices S**	**C**	
Boolean (Coils)					
51	sysalarm_set		52	1	Analog Output 4 LOW
52	sysalarm_set		53	1	Analog Output 5 LOW
53	sysalarm_set		54	1	Analog Output 6 LOW
54	sysalarm_set		55	1	Analog Output 7 LOW
55	sysalarm_set		56	1	Analog Output 8 LOW
56	sysalarm_set		57	1	Analog Output 9 LOW
57	sysalarm_set		58	1	Analog Output 10 LOW
58	sysalarm_set		59	1	Analog Output 11 LOW
59	sysalarm_set		60	1	Analog Output 12 LOW
60	sysalarm_set		61	1	Analog Output 13 LOW
61	sysalarm_set		62	1	Analog Output 14 LOW
62	sysalarm_set		63	1	Analog Output 15 LOW
63	sysalarm_set		64	1	Analog Output 16 LOW
64	sysalarm_set		65	1	Analyzer Failure
65	sysalarm_set		66	1	Power Failure
66	sysalarm_set		67	1	Fused Peak Overflow - Noisy Baseline
67	sysalarm_set		68	1	CPU Battery Low
68	sysalarm_set		69	1	GC Idle
69	sysalarm_set		70	1	Real-Time Clock Failure
70	sysalarm_set		71	1	Analog Input 1 HIGH
71	sysalarm_set		72	1	Analog Input 2 HIGH
72	sysalarm_set		73	1	Analog Input 3 HIGH
73	sysalarm_set		74	1	Analog Input 4 HIGH
74	sysalarm_set		75	1	Analog Input 1 LOW
75	sysalarm_set		76	1	Analog Input 2 LOW
76	sysalarm_set		77	1	Analog Input 3 LOW
77	sysalarm_set		78	1	Analog Input 4 LOW
78	sysalarm_set		79	1	NA

Table C-2 List of User_Modbus Registers

Slave Name **USER_MODBUS**					
Modbus Reg.	**Variable Name**	**Field Name**	**Indices S**	**C**	
Boolean (Coils)					
79	sysalarm_set		80	1	NA
80	sysalarm_set		81	1	NA
81	sysalarm_set		82	1	NA
82	sysalarm_set		83	1	NA
83	sysalarm_set		84	1	NA
84	sysalarm_set		85	1	NA
85	lmtalarm_set		1	1	
86	lmtalarm_set		2	1	
87	lmtalarm_set		3	1	
88	lmtalarm_set		4	1	
89	lmtalarm_set		5	1	
90	lmtalarm_set		6	1	
91	lmtalarm_set		7	1	
92	lmtalarm_set		8	1	
93	lmtalarm_set		9	1	
94	lmtalarm_set		10	1	
95	lmtalarm_set		11	1	
96	lmtalarm_set		12	1	
97	lmtalarm_set		13	1	
98	lmtalarm_set		14	1	
99	lmtalarm_set		15	1	
100	lmtalarm_set		16	1	
101	lmtalarm_set		17	1	
102	lmtalarm_set		18	1	
103	lmtalarm_set		19	1	
104	lmtalarm_set		20	1	
105	stream_data	stream_togg	1	1	
106	stream_data	stream_togg	2	1	
107	stream_data	stream_togg	3	1	

Table C-2 List of User_Modbus Registers

Slave Name **USER_MODBUS**					
Modbus Reg.	**Variable Name**	**Field Name**	**Indices S**	**C**	
Boolean (Coils)					
108	stream_data	stream_togg	4	1	
109	stream_data	stream_togg	5	1	
110	stream_data	stream_togg	6	1	
111	stream_data	stream_togg	7	1	
112	stream_data	stream_togg	8	1	
113	doutcur		1	1	
114	doutcur		2	1	
115	doutcur		3	1	
116	doutcur		4	1	
117	doutcur		5	1	

C.2 SIM_2251 Modbus register list

To use the Modbus Test program and view the contents of SIM_2251 registers, set the Register Mode to "Daniel," as noted in Table C-1.

For a complete list of register assignments, both SIM_2251 and User_Modbus, print a GC Config Report. See "Generating a GC Configuration Report" on page 5-65 for more information.

Note
The information in the following tables is derived from engineering specification number ES-17128-005, "Model 2251 Enhanced Specification Chromatograph Controller Modbus Communication Indices."

Table C-3 List of SIM_2251 Registers

Reg. No.	Description
3001	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #1
3002	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #2
3003	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #3
3004	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #4
3005	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #5
3006	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #6
3007	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #7
3008	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #8
3009	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #9
3010	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #10
3011	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #11
3012	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #12
3013	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #13
3014	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #14
3015	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #15
3016	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #16
3017	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #1
3018	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #2
3019	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #3

Table C-3 List of SIM_2251 Registers

Reg. No.	Description
3020	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #4
3021	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #5
3022	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #6
3023	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #7
3024	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #8
3025	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #9
3026	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #10
3027	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #11
3028	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #12
3029	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #13
3030	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #14
3031	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #15
3032	Component Table *n* (where *n* equals the CDT # used during the last run) - Component #16
3033	Analysis Time (in 1/30ths of a second)
3034	Current Stream
3035	Mask of streams associated with Component Table #1 (Bit 2^n = 1 implies stream *n* included)
3036	Current Month (1-12)
3037	Current day (1-31)
3038	Current Year (0-99)
3039	Current Hour (0-24)
3040	Current Minute (0-59)
3041	Cycle Start Time - Month
3042	Cycle Start Time - Day
3043	Cycle Start Time - Year
3044	Cycle Start Time - Hour
3045	Cycle Start Time - Minute

Table C-4 SIM_2251 MODBUS REGISTER LIST (BIT NUMBERS)

Reg. No.	Description															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
3046	checksum failure	anlyzr failure	D/A 3 high	D/A 3 low	D/A 2 high	D/A 2 low	D/A 1 high	D/A 1 low	spare	spare	A/D 2 high	A/D 2 low	A/D 1 high	A/D 1 low	spare	spare
3047	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	spare	adjust preamp	preamp failure	RF % dev	power failure
3048	Stream #1															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A. #1 low
3049	Stream #1															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A. #1 high
3050	Stream #2															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A. #1 low
3051	Stream #2															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A. #1 high
3052	Stream #3															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A. #1 low
3053	Stream #3															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A. #1 high
3054	Stream #4															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A. #1 low
3055	Stream #4															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A. #1 high

Table C-4 SIM_2251 MODBUS REGISTER LIST (BIT NUMBERS)

Reg. No.	Description															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
3056	Stream #5															
		#15 low	#14 low	#13 low	#12 low	#11 low	#10 low	#9 low	#8 low	#7 low	#6 low	#5 low	#4 low	#3 low	#2 low	O.D.A. #1 low
3057	Stream #5															
		#15 high	#14 high	#13 high	#12 high	#11 high	#10 high	#9 high	#8 high	#7 high	#6 high	#5 high	#4 high	#3 high	#2 high	O.D.A. #1 high
3058	New data flag. Set upon completion of calculations.															
3059	Cal/Analysis flag. Set to **1** if analysis data. Set to **0** if calculation data.															

Table C-5 SIM_2251 Modbus register list (32-bit integers)

Reg. No.	Description
5001	Cycle time (in 1/30ths of a second)
5002	Calibration cycle time (in 1/30ths of a second)

Note
The following registers contain no values until the completion of atleast one analysis run.

Table C-6 SIM_2251 Modbus register list (floating point)

Reg. No.	Description
7001	Mole % - Component #1
7002	Mole % - Component #2
7003	Mole % - Component #3
7004	Mole % - Component #4
7005	Mole % - Component #5
7006	Mole % - Component #6
7007	Mole % - Component #7
7008	Mole % - Component #8
7009	Mole % - Component #9
7010	Mole % - Component #10
7011	Mole % - Component #11
7012	Mole % - Component #12
7013	Mole % - Component #13
7014	Mole % - Component #14
7015	Mole % - Component #15
7016	Mole % - Component #16
7017	GPM or Weight % - Component #1
7018	GPM or Weight % - Component #2
7019	GPM or Weight % - Component #3
7020	GPM or Weight % - Component #4
7021	GPM or Weight % - Component #5

Table C-6 SIM_2251 Modbus register list (floating point)

Reg. No.	Description
7022	GPM or Weight % - Component #6
7023	GPM or Weight % - Component #7
7024	GPM or Weight % - Component #8
7025	GPM or Weight % - Component #9
7026	GPM or Weight % - Component #10
7027	GPM or Weight % - Component #11
7028	GPM or Weight % - Component #12
7029	GPM or Weight % - Component #13
7030	GPM or Weight % - Component #14
7031	GPM or Weight % - Component #15
7032	GPM or Weight % - Component #16
7033	BTU Dry
7034	BTU Saturated
7035	Specific Gravity
7036	Compressibilty
7037	WOBBE Index
7038	Total Unnormalized Mole %
7039	Total GPM
7040	Calculation, User-defined #1
7041	Calculation, User-defined #2
7042	Calculation, User-defined #3
7043	Calculation, User-defined #4
7044	Calculation, User-defined #5
7045-7053	Unused
7054	Actual BTU
7055	Averages, User-defined #1
7056	Averages, User-defined #2
7057	Averages, User-defined #3
7058	Averages, User-defined #4
7059	Averages, User-defined #5
7060	Averages, User-defined #6

Table C-6 SIM_2251 Modbus register list (floating point)

Reg. No.	Description
7061	Averages, User-defined #7
7062	Averages, User-defined #8
7063	Averages, User-defined #9
7064	Averages, User-defined #10
7065	Averages, User-defined #11
7066	Averages, User-defined #12
7067	Averages, User-defined #13
7068	Averages, User-defined #14
7069	Averages, User-defined #15
7070	First Archive of Average, User-defined #1
7071	First Archive of Average, User-defined #2
7072	First Archive of Average, User-defined #3
7073	First Archive of Average, User-defined #4
7074	First Archive of Average, User-defined #5
7075	First Archive of Average, User-defined #6
7076	First Archive of Average, User-defined #7
7077	First Archive of Average, User-defined #8
7078	First Archive of Average, User-defined #9
7079	First Archive of Average, User-defined #10
7080	First Archive of Average, User-defined #11
7081	First Archive of Average, User-defined #12
7082	First Archive of Average, User-defined #13
7083	First Archive of Average, User-defined #14
7084	First Archive of Average, User-defined #15
7085	Analog Input #1 - Current Value in Engineering Units
7086	Analog Input #2 - Current Value in Engineering Units
7087	Actual BTU (Last Calibration)
7088	Dry BTU (Last Calibration)
7089	Saturated BTU (Last Calibration)
7090	WOBBE Index (Last Calibration)
7091	Relative Density (Last Calibration)

Table C-6 SIM_2251 Modbus register list (floating point)

Reg. No.	Description
7092	Compressibilty (Last Calibration)
7093	Total GPM (Last Calibration)
7094	Total Unnormalized (Last Calibration)
7095-7110	Response Factors (#1-16), Component Table *n* (where *n* equals the CDT # used during the last run)
7111-7126	Response Factors (#1-16), Component Table *n* (where *n* equals the CDT # used during the last run)
7127-7162	Averages, User-define 1-36 **Note**: Registers 7127-7141 are copies of registers 7055-7069.
7163-7198	Maximum values from averages, User-define 1-36
7199-7234	Minimum values from averages, User-define 1-36
7235-7270	First (most recent) archive of averages, User-define 1-36 **Note**: Registers 7235-7249 are copies of registers 7070-7084.
7271-7306	First (most recent) archive of maximum values from averages, User-define 1-36
7307-7342	First (most recent) archive of minimum values from averages, User-define 1-36
7343-7378	Second archive of averages, User-define 1-36
7379-7414	Second archive of maximum values from averages, User-define 1-36
7415-7450	Second archive of minimum values from averages, User-define 1-36
7451-7486	Third (oldest) archive of averages, User-define 1-36
7487-7522	Third (oldest) archive of maximum values from averages, User-define 1-36
7523-7558	Third (oldest) archive of minimum values from averages, User-define 1-36

Table C-7 SIM_2251 Modbus Communication Indices

Reg. No.	**Description**: RW = read/write (1) or read-only (0) LEN = length REGS = number of Modbus registers required				
	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, OR DESCRIPTION
9001	0	string	6	3	device model number
9004	0	string	4	2	software revision
9006	1	integer	2	1	system time month (1-12)
9007	1	integer	2	1	system time day (1-31)
9008	1	integer	2	1	system time year (0-99)

Table C-7 SIM_2251 Modbus Communication Indices

Reg. No.	Description: RW = read/write (1) or read-only (0) LEN = length REGS = number of Modbus registers required				
	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, OR DESCRIPTION
9009	1	integer	2	1	system time hour (0-23)
9010	1	integer	2	1	system time minutes (0-59)
9011	1	integer	2	1	system time seconds (0-59)
9012	1	integer	2	1	system time day (0-6)
9013	0	integer	2	1	plug ID (Modbus or Device ID, per DIP switch settings)
9014	1	long	4	2	site ID
9016	0	string	12	5	device serial number
9022	0	integer	2	1	analysis time 1
9023	0	integer	2	1	analysis time 2 (for dual detector system)
9024	0	integer	2	1	cycle time 1
9025	0	integer	2	1	cycle time 2 (for dual detector system)
9026	0	integer	2	1	run time 1
9027	0	integer	2	1	run time 2 (for dual detector system)
9028	0	integer	2	1	current stream 1
9029	0	integer	2	1	current stream 2 (for dual detector system)
9030	0	integer	2	1	system mode 1
9031	0	integer	2	1	system mode 2 (for dual detector system)
9032	0	integer	2	1	calibrating 1
9033	0	integer	2	1	calibrating 2 (for dual detector system)
9034	0	integer	2	1	active alarm (red light at GC controller)
9035	0	integer	2	1	unack'd alarm (yellow light at GC controller)
9036	0	integer	2	1	hourly average reset - year
9037	0	integer	2	1	hourly average reset - month
9038	0	integer	2	1	hourly average reset - day
9039	0	integer	2	1	hourly average reset - hour
9040	0	integer	2	1	hourly average reset - minutes
9041	0	integer	2	1	24-hour average reset - year
9042	0	integer	2	1	24-hour average reset - month
9043	0	integer	2	1	24-hour average reset - day

Table C-7 SIM_2251 Modbus Communication Indices

Reg. No.	**Description**: RW = read/write (1) or read-only (0) LEN = length REGS = number of Modbus registers required			
	RW	TYPE	LEN	REGS	VARIABLE NAME, POINTER, OR DESCRIPTION
9044	0	integer	2	1	24-hour average reset - hour
9045	0	integer	2	1	24-hour average reset - minutes
9046	0	integer	2	1	weekly average reset - year
9047	0	integer	2	1	weekly average reset - month
9048	0	integer	2	1	weekly average reset - day
9049	0	integer	2	1	weekly average reset - hour
9050	0	integer	2	1	weekly average reset - minutes
9051	0	integer	2	1	monthly average reset - year
9052	0	integer	2	1	monthly average reset - month
9053	0	integer	2	1	monthly average reset - day
9054	0	integer	2	1	monthly average reset - hour
9055	0	integer	2	1	monthly average reset - minutes
9056	0	integer	2	1	variable average reset - year
9057	0	integer	2	1	variable average reset - month
9058	0	integer	2	1	variable average reset - day
9059	0	integer	2	1	variable average reset - hour
9060	0	integer	2	1	variable average reset - minutes

Appendix D, Basic and advanced system variables

D.1 GPA system variables

Group	Basic Calculations	Advanced Calculations
Analysis Component	Mole % Weight % Weight % Carbon Liquid Volume % Gal/1000 SCF GPA Real Rel Den Gas HV Gross BTU Dry HV Net BTU Dry HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Inf MJ/m3 Dry HV Sup MJ/kg Dry HV Inf MJ/kg Dry Peak Area Peak Height Peak Width @ Half-Height Component Number	Mole % Weight % Weight % Carbon Liquid Volume % Gal/1000 SCF Response Factor Retention Time GPA Real Rel Den Gas HV Gross BTU Dry HV Net BTU Dry HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Inf MJ/m3 Dry HV Sup MJ/kg Dry HV Inf MJ/kg Dry Peak Area Peak Height Peak Width @ Half-Height Component Number

Group	Basic Calculations	Advanced Calculations
Analysis Stream	Avg Molecular Weight Base Pressure Base Temperature GPA Z Factor GPA Real Rel Den Gas GPA Wobbe Index Gas Den lbm/1000 ft3 HV Gross BTU Dry HV Gross BTU Sat HV Net BTU Dry HV Net BTU Sat HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Sup MJ/kg Dry HV Inf MJ/kg Dry HV Sup Kcal/kg Dry HV Inf Kcal/kg Dry Reid Vapor Press Start Time Total Unnormalized Conc Weight % Carbon Weight % C from Methane	Analysis Time Avg Molecular Weight Base Pressure Base Temperature CricondenTherm Pres CricondenTherm Temp Cycle Time Dewpoint Pres Dewpoint Temp GPA Z Factor GPA Gas Den kg/m3 GPA Real Rel Den Gas GPA Wobbe Index Gal/1000 SCF C2+ Gal/1000 SCF C3+ Gal/1000 SCF C4+ Gal/1000 SCF C5+ Gal/1000 SCF C6+ Gas Den lbm/1000 ft3 HV Gross BTU Dry HV Gross BTU Sat HV Gross BTU Act HV Net BTU Dry HV Net BTU Sat HV Net BTU Act HV Gross BTU/lb Dry

Group	Basic Calculations	Advanced Calculations
Analysis Stream (cont.)		HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Sup MJ/m3 Act HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Inf MJ/m3 Act HV Sup MJ/kg Dry HV Inf MJ/kg Dry HV Sup Kcal/m3 Dry HV Sup Kcal/m3 Sat HV Sup Kcal/m3 Act HV Inf Kcal/m3 Dry HV Inf Kcal/m3 Sat HV Inf Kcal/m3 Act HV Sup Kcal/kg Dry HV Inf Kcal/kg Dry Liquid Density lb/gal Liquid Density kg/m3 No of Peaks Found No of Comp Reid Vapor Press Rel Den Liq @ 60F Rel Den Liq @ 15C Start Time Total Unnormalized Conc Weight % Carbon Weight % C from Methane

Group	Basic Calculations	Advanced Calculations
Analysis Optional Base Pressures	n/a	Opt Base Pressure Gal/1000 SCF C2+ Gal/1000 SCF C3+ Gal/1000 SCF C4+ Gal/1000 SCF C5+ Gal/1000 SCF C6+ HV Gross BTU Dry HV Gross BTU Sat HV Gross BTU Act HV Net BTU Dry HV Net BTU Sat HV Net BTU Act HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Sup MJ/m3 Act HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Inf MJ/m3 Act HV Sup Kcal/m3 Dry HV Sup Kcal/m3 Sat HV Sup Kcal/m3 Act HV Inf Kcal/m3 Dry HV Inf Kcal/m3 Sat HV Inf Kcal/m3 Act
Calibration	n/a	Area or Height
Component	n/a	Resp Factor Resp Factor % Dev Ret Time Ret Time % Dev Component Number
Calibration Stream	n/a	Start Time
Final Calibration Component	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number

Group	Basic Calculations	Advanced Calculations
Final Calibration Stream	RF Dev Alarm Start Time	GPA Z Factor GPA Real Rel Den Gas GPA Wobbe Index HV Gross BTU Dry HV Gross BTU Sat RF Dev Alarm Start Time Total Unnormalized Conc
Last Analysis Component	Mole % Weight % Weight % Carbon Liquid Volume % Gal/1000 SCF GPA Real Rel Den Gas HV Gross BTU Dry HV Net BTU Dry HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Inf MJ/m3 Dry HV Sup MJ/kg Dry HV Inf MJ/kg Dry Peak Area Peak Height Peak Width @ Half-Height Component Number	Mole % Weight % Weight % Carbon Liquid Volume % Gal/1000 SCF Response Factor Retention Time GPA Real Rel Den Gas HV Gross BTU Dry HV Net BTU Dry HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Inf MJ/m3 Dry HV Sup MJ/kg Dry HV Inf MJ/kg Dry Peak Area Peak Height Peak Width @ Half-Ht Component Number

Group	Basic Calculations	Advanced Calculations
Last Analysis Stream	Avg Molecular Weight Base Pressure Base Temperature GPA Z Factor GPA Real Rel Den Gas GPA Wobbe Index Gas Den lbm/1000 ft3 HV Gross BTU Dry HV Gross BTU Sat HV Net BTU Dry HV Net BTU Sat HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Sup MJ/kg Dry HV Inf MJ/kg Dry HV Sup Kcal/kg Dry HV Inf Kcal/kg Dry Is Cal Run Reid Vapor Press Start Time Stream No Total Unnormalized Conc Weight % Carbon Weight % C from Methane	Analysis Time Avg Molecular Weight Base Pressure Base Temperature CricondenTherm Pres CricondenTherm Temp Cycle Time Dewpoint Pres Dewpoint Temp GPA Z Factor GPA Gas Den kg/m3 GPA Real Rel Den Gas GPA Wobbe Index Gal/1000 SCF C2+ Gal/1000 SCF C3+ Gal/1000 SCF C4+ Gal/1000 SCF C5+ Gal/1000 SCF C6+ Gas Den lbm/1000 ft3 HV Gross BTU Dry HV Gross BTU Sat HV Gross BTU Act HV Net BTU Dry HV Net BTU Sat HV Net BTU Act HV Gross BTU/lb Dry HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Sup MJ/m3 Act HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Inf MJ/m3 Act HV Sup MJ/kg Dry HV Inf MJ/kg Dry HV Sup Kcal/m3 Dry HV Sup Kcal/m3 Sat HV Sup Kcal/m3 Act HV Inf Kcal/m3 Dry HV Inf Kcal/m3 Sat HV Inf Kcal/m3 Act HV Sup Kcal/kg Dry HV Inf Kcal/kg Dry Is Cal Run Liquid Density lb/gal Liquid Density kg/m3 No of Peaks Found No of Comp

Group	Basic Calculations	Advanced Calculations
Last Analysis Stream (cont.)		Reid Vapor Press Rel Den Liq @ 60F Rel Den Liq @ 15C Start Time Stream No Total Unnormalized Conc Weight % Carbon Weight % C from Methane
Last Analysis Optional Base Pressures	n/a	Opt Base Pressure Gal/1000 SCF C2+ Gal/1000 SCF C3+ Gal/1000 SCF C4+ Gal/1000 SCF C5+ Gal/1000 SCF C6+ HV Gross BTU Dry HV Gross BTU Sat HV Gross BTU Act HV Net BTU Dry HV Net BTU Sat HV Net BTU Act HV Sup MJ/m3 Dry HV Sup MJ/m3 Sat HV Sup MJ/m3 Act HV Inf MJ/m3 Dry HV Inf MJ/m3 Sat HV Inf MJ/m3 Act HV Sup Kcal/m3 Dry HV Sup Kcal/m3 Sat HV Sup Kcal/m3 Act HV Inf Kcal/m3 Dry HV Inf Kcal/m3 Sat HV Inf Kcal/m3 Act
Last Calibration Component	n/a	Area or Height Resp Factor Ret Time Component Number
Last Calibration Stream	n/a	Start Time Stream No
Last Final Calibration Component	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number

Group	Basic Calculations	Advanced Calculations
Last Final Calibration	RF Dev Alarm Start Time	GPA Z Factor GPA Real Rel Den Gas
Stream	Stream No	GPA Wobbe Index HV Gross BTU Dry HV Gross BTU Sat RF Dev Alarm Start Time Stream No Total Unnormalized Conc
Hardware - Heaters	Temperature	Temperature
Hardware - Valves	Current Value	Current Value
Hardware - Discrete Inputs	Current Value	Current Value
Hardware - Discrete Outputs	Current Value	Current Value
Hardware - Analog Inputs	Current Value	Current Value
Hardware - Analog Outputs	Current Value	Current Value
Application - System	Default Stream Sequence	Default Stream Sequence
Application - Component Data Table	n/a	Det # Ret Time Resp Fact Calib Conc RT Secs Dev Resp Fact % Gross Dry BTU Net Dry BTU Gross Dry BTU/lb HV Sup MJ/m3 HV Inf MJ/m3 HV Sup MJ/kg HV Inf MJ/kg Gals/1000 SCF Reid Vapor LBs/Gallon Rel Dens Gas Rel Dens Liquid Mole Weight Carbon Weight Rel Resp Fact Multi-level Calib 'a' Multi-level Calib 'b' Multi-level Calib 'c' Multi-level Calib 'd'

Group	Basic Calculations	Advanced Calculations
Application - Validation Data Table	n/a	Nominal Value Percent Deviation
Application - Averages	Min Max Avg Samples	Min Max Avg Samples
Application - User Defined Calculation	Calc Result	Calc Result
Application - Limit Alarms	Alarm Low On Alarm High On	Alarm Low On Alarm High On Value Causing Alarm Violated Alarm Limit Date
Application - System Alarms	Alarm On	Alarm On Value Causing Alarm Violated Alarm Limit Date
Application - Streams	n/a	Usage TEV Total Runs Avg Runs Start Time Interval Calibration Stream Base Pressure Base Temperature Optional Pressure 1 Optional Pressure 2 Optional Pressure 3 Next Cal/Val Time Status
Validation	Average Value Current Value	Average Value Current Value
GC Control	Auto Sequence Halt Single Stream Calibration Validation	Auto Sequence Halt Single Stream Calibration Validation

Group	Basic Calculations	Advanced Calculations
GC Status	Current Stream Last Stream Cycle Clock Counter Cycle Time Anly Time Current Mode Next Stream Last Mode Calibration Failed Validation Failed Cycle Complete Pulse Current Day Current Month Current Year Current Hour Current Minute Current Second Active Alarm Flag UnAck Alarm Flag	Current Stream Last Stream Cycle Clock Counter Cycle Time Anly Time Current Mode Next Stream Last Mode Calibration Failed Validation Failed Cycle Complete Pulse Current Day Current Month Current Year Current Hour Current Minute Current Second Active Alarm Flag UnAck Alarm Flag

D.2 ISO system variables

Group	Basic Calculations	Advanced Calculations
Analysis Component	Mole % Weight % Liquid Volume % ISO CV Sup Dry - Pri ISO CV Inf Dry - Pri ISO CV Sup Dry - Sec ISO CV Inf Dry - Sec Peak Area Peak Height Peak Width @ Half-Height Component Number	Mole % Weight % Liquid Volume % Response Factor Retention Time ISO CV Sup Dry - Pri ISO CV Inf Dry - Pri ISO CV Sup Dry - Sec ISO CV Inf Dry - Sec Peak Area Peak Height Peak Width @ Half-Height Component Number

Group	Basic Calculations	Advanced Calculations
Analysis Stream	Avg Molecular Weight Base Pressure Start Time Total Unnormalized Conc ISO Temp RefC - Pri ISO Temp RefV - Pri ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO Gas Den kg/m3 - Pri ISO Real Rel Den Gas - Pri ISO Wobbe Index Sup - Pri ISO Wobbe Index Inf - Pri	Avg Molecular Weight Base Pressure Start Time Total Unnormalized Conc ISO Temp RefC - Pri ISO Temp RefV - Pri ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO Gas Den kg/m3 - Pri ISO Real Rel Den Gas - Pri ISO Wobbe Index Sup - Pri ISO Wobbe Index Inf - Pri ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO CV Sup Dry - Sec ISO CV Sup Sat - Sec ISO CV Inf Dry - Sec ISO CV Inf Sat - Sec ISO Z Factor - Pri ISO Z Factor - Sec ISO Gas Den kg/m3 - Pri ISO Gas Den kg/m3 - Sec ISO Real Rel Den Gas - Pri ISO Real Rel Den Gas - Sec ISO Wobbe Index Sup - Pri ISO Wobbe Index Sup - Sec ISO Wobbe Index Inf - Pri ISO Wobbe Index Inf - Sec ISO Soot Index ISO Incomp Combustion Fact ISO Latent Heat Cap Ratio
Analysis Optional Base Pressures	n/a	Opt Base Pressure ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO CV Sup Dry - Sec ISO CV Sup Sat - Sec ISO CV Inf Dry - Sec ISO CV Inf Sat - Sec
Calibration	n/a	Area or Height

Group	Basic Calculations	Advanced Calculations
Component	n/a	Resp Factor Resp Factor % Dev Ret Time Ret Time % Dev Component Number
Calibration Stream	n/a	Start Time
Final Calibration Component	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number
Final Calibration Stream	RF Dev Alarm Start Time	ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO Z Factor - Pri ISO Real Rel Den Gas - Pri ISO Wobbe Index Sup - Pri RF Dev Alarm Start Time Total Unnormalized Conc
Last Analysis Component	Mole % Weight % Liquid Volume % ISO CV Sup Dry - Pri ISO CV Inf Dry - Pri ISO CV Sup Dry - Sec ISO CV Inf Dry - Sec Peak Area Peak Height Peak Width @ Half-Ht Component Number	Mole % Weight % Liquid Volume % Response Factor Retention Time ISO CV Sup Dry - Pri ISO CV Inf Dry - Pri ISO CV Sup Dry - Sec ISO CV Inf Dry - Sec Peak Area Peak Height Peak Width @ Half-Ht Component Number

Group	Basic Calculations	Advanced Calculations
Last Analysis Stream	Avg Molecular Weight Base Pressure Is Cal Run Start Time Stream No Total Unnormalized Conc ISO Temp RefC - Pri ISO Temp RefV - Pri ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO Gas Den kg/m3 - Pri ISO Real Rel Den Gas - Pri ISO Wobbe Index Sup - Pri ISO Wobbe Index Inf - Pri	Analysis Time Avg Molecular Weight Base Pressure CricondenTherm Pres CricondenTherm Temp Cycle Time Dewpoint Pres Dewpoint Temp Is Cal Run No of Peaks Found No of Comp Reid Vapor Press Rel Den Liq @ 60F Rel Den Liq @ 15C Start Time Stream No Total Unnormalized Conc ISO Temp RefC - Pri ISO Temp RefV - Pri ISO Temp RefC - Sec ISO Temp RefV - Sec ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO CV Sup Dry - Sec ISO CV Sup Sat - Sec ISO CV Inf Dry - Sec ISO CV Inf Sat - Sec ISO Z Factor - Pri ISO Z Factor - Sec ISO Gas Den kg/m3 - Pri ISO Gas Den kg/m3 - Sec ISO Real Rel Den Gas - Pri ISO Real Rel Den Gas - Sec ISO Wobbe Index Sup - Pri ISO Wobbe Index Sup - Sec ISO Wobbe Index Inf - Pri ISO Wobbe Index Inf - Sec ISO Soot Index ISO Incomp Combustion Fact ISO Latent Heat Cap Ratio
Last Analysis Optional Base Pressures	n/a	Opt Base Pressure ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri ISO CV Inf Dry - Pri ISO CV Inf Sat - Pri ISO CV Sup Dry - Sec ISO CV Sup Sat - Sec ISO CV Inf Dry - Sec ISO CV Inf Sat - Sec

Group	Basic Calculations	Advanced Calculations
Last Calibration Component	n/a	Area or Height Resp Factor Ret Time Component Number
Last Calibration Stream	n/a	Start Time Stream No
Last Final Calibration Component	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number	Calib Conc Old Resp Factor New Resp Factor New RF Update Flag Resp Factor % Dev Old Ret Time New Ret Time New RT Update Flag Ret Time % Dev Component Number
Last Final Calibration	RF Dev Alarm Start Time	ISO CV Sup Dry - Pri ISO CV Sup Sat - Pri
Stream	Stream No	ISO Z Factor - Pri ISO Real Rel Den Gas - Pri ISO Wobbe Index Sup - Pri RF Dev Alarm Start Time Stream No Total Unnormalized Conc
Hardware - Heaters	Temperature	Temperature
Hardware - Valves	Current Value	Current Value
Hardware - Discrete Inputs	Current Value	Current Value
Hardware - Discrete Outputs	Current Value	Current Value
Hardware - Analog Inputs	Current Value	Current Value
Hardware - Analog Outputs	Current Value	Current Value
Application - System	Default Stream Sequence	Default Stream Sequence

Group	Basic Calculations	Advanced Calculations
Application - Component Data Table	n/a	Det # Ret Time Resp Fact Calib Conc RT Secs Dev Resp Fact % Sum Factor - Pri Sum Factor - Sec CV Sup KJ/mol - Pri CV Inf KJ/mol - Pri CV Sup KJ/mol - Sec CV Inf KJ/mol - Sec Rel Dens Gas Rel Dens Liquid Mole Weight Rel Resp Fact Multi-level Calib 'a' Multi-level Calib 'b' Multi-level Calib 'c' Multi-level Calib 'd'
Application - Validation Data Table	n/a	Percent Deviation Percent Deviation
Application - Averages	Min Max Avg Samples	Min Max Avg Samples
Application - User Defined Calculation	Calc Result	Calc Result
Application - Limit Alarms	Alarm Low On Alarm High On	Alarm Low On Alarm High On Value Causing Alarm Violated Alarm Limit Date
Application - System Alarms	Alarm On	Alarm On Value Causing Alarm Violated Alarm Limit Date

Group	Basic Calculations	Advanced Calculations
Application - Streams	n/a	Usage TEV Total Runs Avg Runs Start Time Interval Calibration Stream Base Pressure Optional Pressure 1 Optional Pressure 2 Optional Pressure 3 Next Cal/Val Time Status
Validation	Average Value Current Value	Average Value Current Value
GC Control	Auto Sequence Halt Single Stream Calibration Validation	Auto Sequence Halt Single Stream Calibration Validation
GC Status	Current Stream Last Stream Cycle Clock Counter Cycle Time Anly Time Current Mode Next Stream Last Mode Calibration Failed Validation Failed Cycle Complete Pulse Current Day Current Month Current Year Current Hour Current Minute Current Second Active Alarm Flag UnAck Alarm Flag	Current Stream Last Stream Cycle Clock Counter Cycle Time Anly Time Current Mode Next Stream Last Mode Calibration Failed Validation Failed Cycle Complete Pulse Current Day Current Month Current Year Current Hour Current Minute Current Second Active Alarm Flag UnAck Alarm Flag

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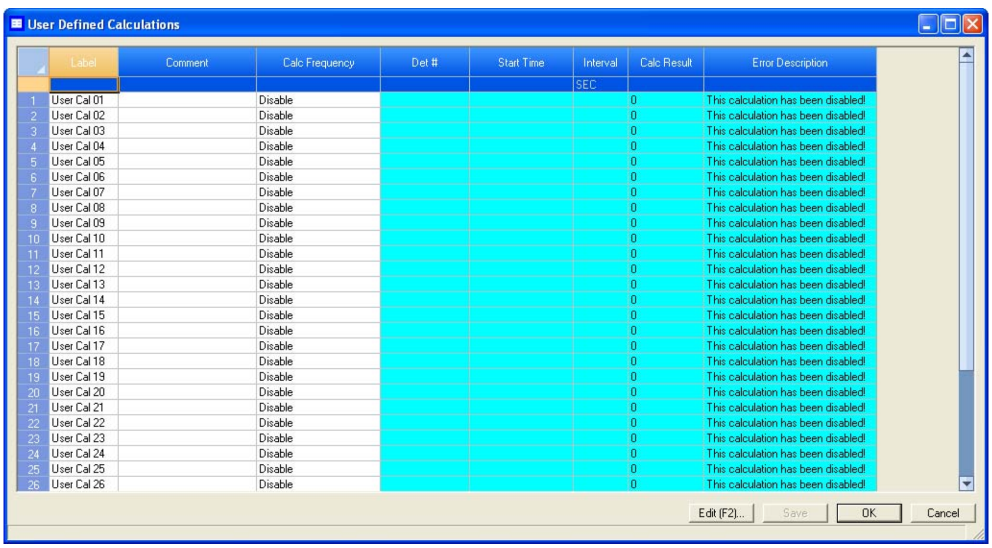
Appendix E, Creating custom calculations

To create or edit a customized calculation using GC analysis data, do the following:

1. Select **Applications → Calculations → User Defined...**. The *User Defined Calculations* window appears, containing a list of all the user-defined calculations that are available to the GC.

Figure E-1. The User Defined Calculations window



2. Click **Insert before** to add a row to the *User Defined Calculations* table.

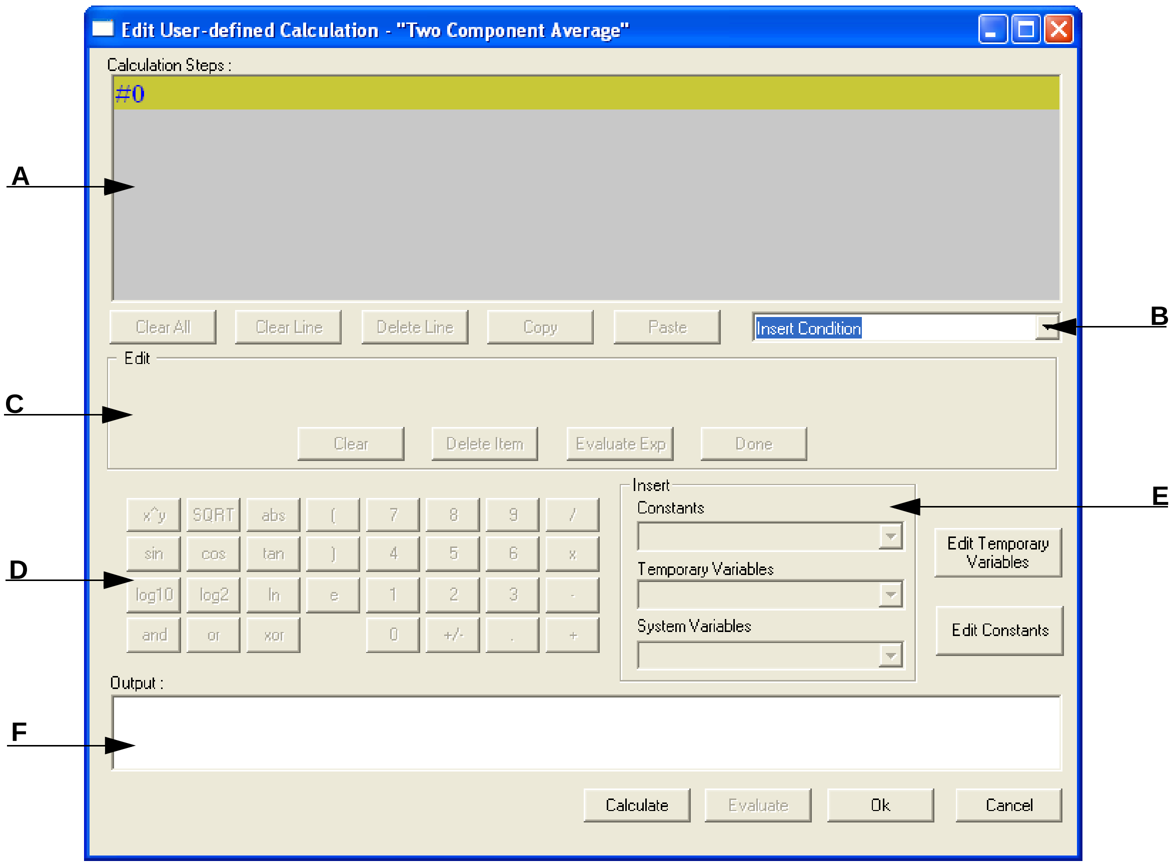
Note

To delete this--or any--row from the table, click **Delete.**

3. Double-click the *Label* cell and enter a name for the calculation you are about to create. If you want to enter a short description for the new calculation, double-click the *Comment* cell and enter it there.

4. Click **Edit**. The *Edit User-defined Calculation* window appears.

Figure E-2. The Edit User-defined Calculation window



In MON 20/20, building a calculation is similar to building a simple program. You have constants and two types of variables available, as well as two calculation-building commands. You can also add comments that will be ignored by the application but that can help you explain the logic and structure of the calculation you are designing.

The following is a description of the design elements of the *Edit User-defined Calculation* window:

- Element **A** - Called the **Calculation Steps Viewer**, this element displays the line-by-line construction of the calculation as it is being built. The following commands allow you to interact with this area:
  - Click **Clear All** to clear the content of the Calculation Steps Viewer.
  - Click **Clear Line** to clear the content of the selected line.

Note
If the selected line is an "If-Then" statement, then the entire condition is cleared. This button is disabled when the cursor is on an "else" or "endif" condition.

  - Click **Delete Line** to delete the selected line.

Note
If the selected line is the beginning of a conditional statement, then the entire "If-Then" block will be deleted along with the expressions that constitute the "If-Then" construct. If the selected line is part of the conditional "If-Then" construct—that is, the line only has "Else" or "Endif" in it—then the entire "If-Then" construct will be deleted.

  - Click **Copy** to copy the selected line to the clipboard. You cannot copy keywords such as "**else**" or "**endif**."
  - Click **Paste** to paste the content of the clipboard into a selected line. If the line already has a calculation in it, it is cleared before the content of the clipboard is pasted into it.
- Element **B** - A drop-down menu with the following three commands:
  - **Insert Comment** - Adds a comment to the calculation. Each comment is preceded by "//."
  - **Insert Condition** - Adds an "If-Then" statement to the calculation.
  - **Insert Expression** - Adds a mathematical expression to the calculation.
- Element **C** - Also called the **Expression Editor**, this section is the work area where the comment, condition or expression is built

before being added to the Calculation Steps Viewer. There are four modes of the Expression Editor, depending upon what action is being performed:

Figure E-3. Expression Editor - No Action

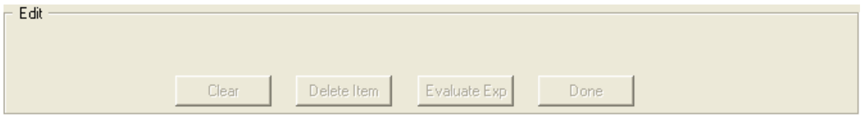


Figure E-4. Expression Editor - Insert Comment

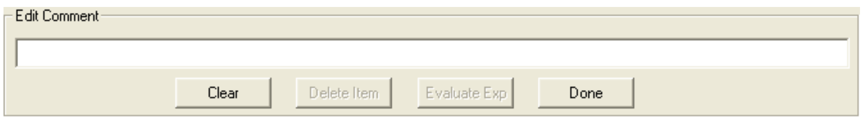


Figure E-5. Expression Editor - Insert Condition

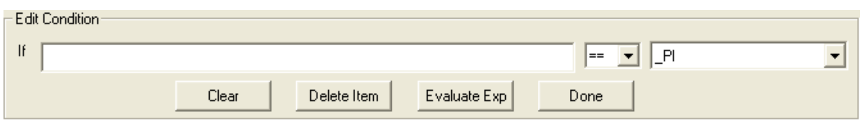
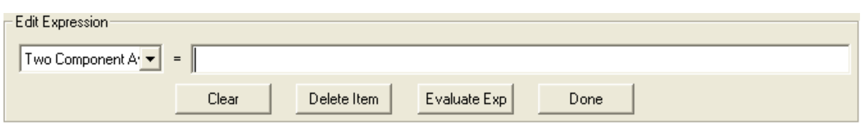


Figure E-6. Expression Editor - Insert Expression



The following commands allow you to interact with the Expression Editor:

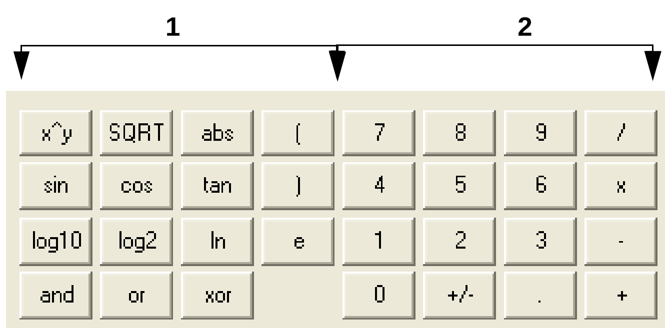
- Click **Clear** to clear the content of the entire line. The line itself is not deleted.
- Click **Delete Item** to delete the currently active token. Each mathematical function, numeric data, and mathematical operation is treated as a token. The token to the right of the current cursor location is treated as the currently active token.
- Click **Evaluate Exp** to check the validity of the expression. If any errors are detected in the syntax, then an error will be reported in the Output window.

Note
This button is only active when the line being edited is an expression.

- Click **Done** to evaluate the expression and copy it to the Calculations Steps Viewer. If there are any errors in the expression, they are reported in the Output window.

- Element **D** - This section contains calculator functions that can be used to build a mathematical expression. This section can be divided into two parts:

Figure E-7. Calculator functions



- **Section 1** - This section contains the following keys:

x^y	x to the power of y
SQRT	Square Root
abs	Absolute Value
sin	Sine
cos	Cosine
tan	Tan
log10	Logarithm to the base 10
log2	Logarithm to the base 2
ln	Logarithm to the base e
and	Logical AND
or	Logical OR
xor	Logical XOR
(	Open bracket
)	Close bracket

- **Section 2** - This section contains the traditional calculator keys and can be used with your keyboard's **Numpad**.

Note
Make sure to engage your keyboard's Numlock before using the Numpad.

- Section **E** - This section contains drop-down menus and buttons that allow you to create and select constants and variables that can be added to your mathematical expressions.

- **Constants** - Allows you to select constants from a drop-down list.
- **Temporary Variables** - Allows you to select temporary, user-created variables from a drop-down list.
- **System Variables** - Allows you to select system variables.
- **Edit Temporary Variables** - Allows you to create variables.
- **Edit Constants** - Allows you to create system-wide constants that can be used in user-defined calculations.

- Section **F** - This section, called the **Output Display**, displays status information.

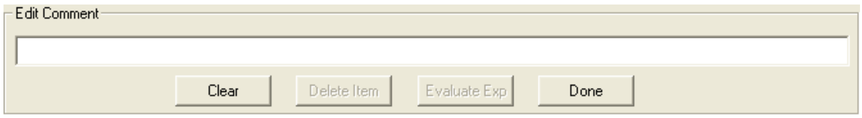
5. Use the following procedures to build your calculation in the Calculation Steps Viewer:
   - "Inserting a comment" on page E-7
   - "Inserting a conditional statement" on page E-9
   - "Inserting an expression" on page E-11
   - "Creating a constant" on page E-14
   - "Creating or editing a temporary variable" on page E-15
   - "Inserting a system variable" on page E-16
   - "Using user-defined calculations" on page E-17
6. To see the result of the calculation, click **Calculate**. The results display in the **Output** window. To validate the calculation for errors, click **Evaluate**. The results of the validation check display in the **Output** window. To save the calculation and to close the *Edit User-defined Calculation* window, click **OK**.
7. On the *User Defined Calculations* window, to save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

E.1 Inserting a comment

To add a comment to the calculation, do the following:

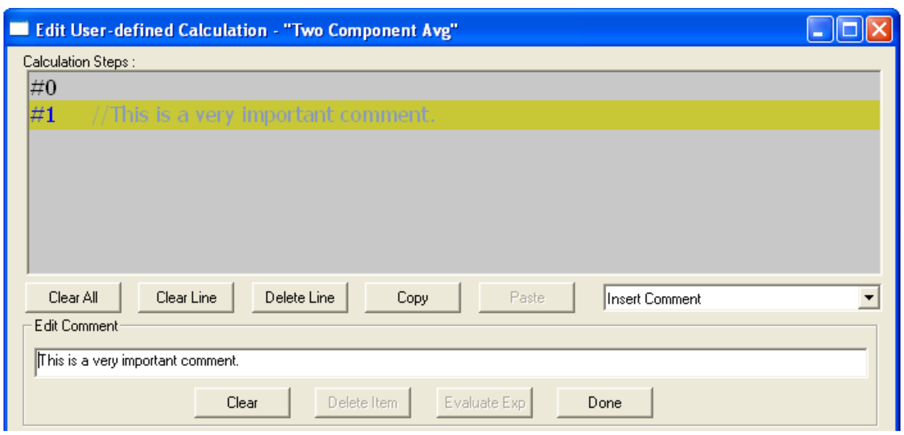
1. Click on the *Insert* drop-down list and select **Insert Comment**. A new line will be added to the **Calculation Steps Viewer** and the **Expression Editor** will switch to *Edit Comment* mode.

Figure E-8. Edit Comment mode



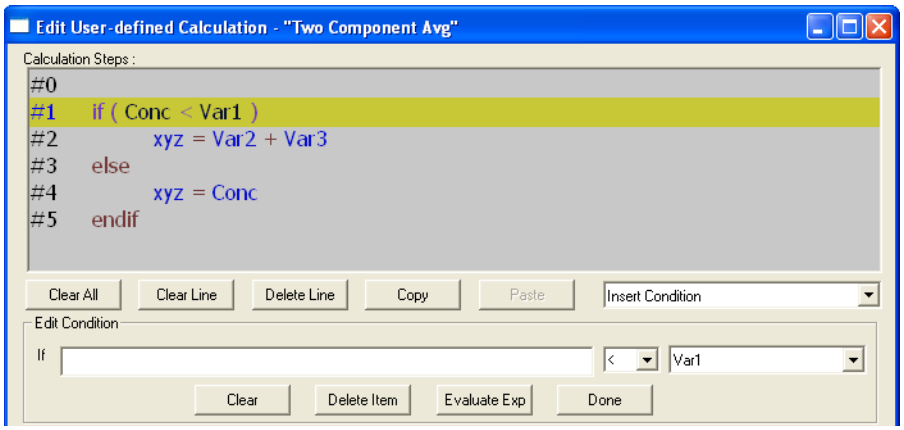
2. Enter the comment into the *Edit Comment* textbox and then click **Done**. The comment will be added to the **Calculation Steps Viewer**.

Figure E-9. Calculation Steps Viewer



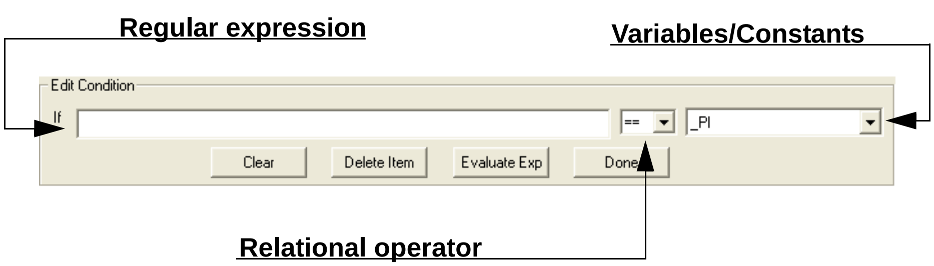
E.2 Inserting a conditional statement

Figure E-10. An example of a conditional statement



The **Expression Editor** in *Edit Condition* mode allows you to build the first line of the conditional statement:

Figure E-11. The Expression Editor in Edit Condition mode



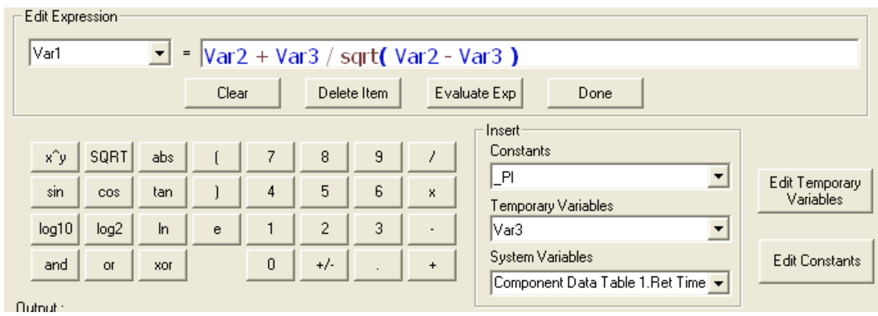
Expressions are built using the **Expression Editor** in *Edit Expression* mode.

To add a conditional statement, do the following:

1. Click on the *Insert* drop-down list and select **Insert Condition**. A new line is added to the **Calculation Steps Viewer** and the **Expression Editor** switches to *Edit Condition* mode.

2. Add an expression. You can use constants, temporary variables, system variables, and the calculator functions to build the expression. For information on inserting system variables, see page E-16. For information on creating variables, see page E-15. For information on creating constants, see page E-14.

Figure E-12. Edit Expression area

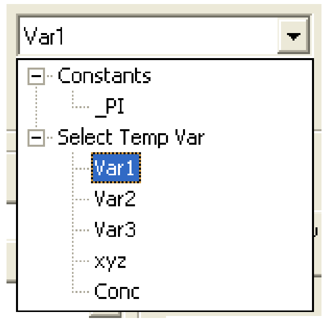


3. Select a relational operator from the drop-down list. You have the following options:

<	Less than
<=	Less than or equal
>	Greater than
>=	Greater than or equal
==	Equal
!=	Not equal

4. To add a variable or constant to the expression, click the *Variable/ Constant* drop-down list and select the appropriate item.

Figure E-13. the Variable/Constant drop-down list



For information on creating variables, see page E-15. For information on creating constants, see page E-14.

5. Click **Done**. MON 20/20 validates the statement and if there are no errors, it adds it to the Calculation Steps Viewer.

Figure E-14. Calculation Steps Viewer

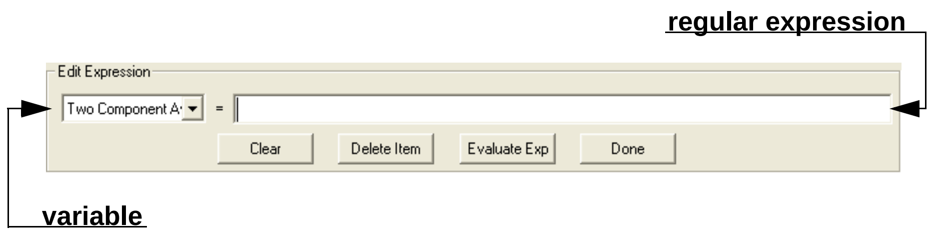
To complete the conditional statement, use the **Expression Editor** in *Edit Expression* mode to add the necessary mathematical expressions.

E.3 Inserting an expression

A mathematical expression has the following structure:

Variable = *Regular expression*

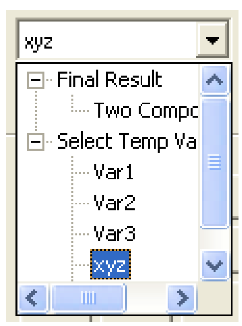
Figure E-15. Edit Expression area



To add an expression to a conditional statement or calculation, do the following:

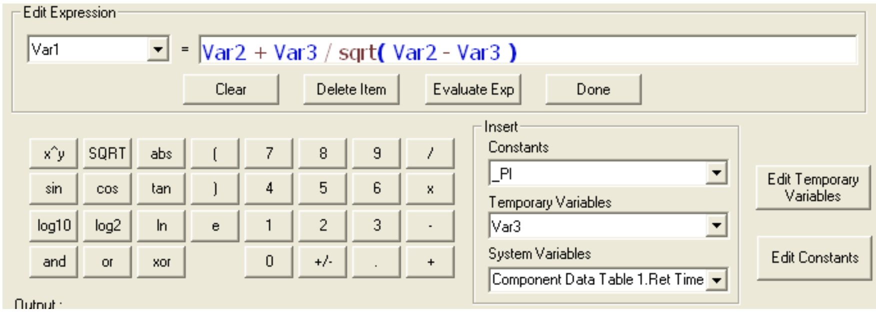
1. Click on the *Insert* drop-down list and select **Insert Expression**. A new line is added to the **Calculation Steps Viewer** and the **Expression Editor** switches to *Edit Expression* mode.
2. Select a variable from the *Variable* drop-down tree view. You can select either a temporary variable or you can set the expression you are building as the final result of your new user-defined calculation. For instance, if the user-defined calculation you are building is called 'User Calc 1,' then you can select **User Calc 1** from the **Final Result** tree view. For information on creating variables, see "Creating or editing a temporary variable" on page E-15.

Figure E-16. The Final Result tree view



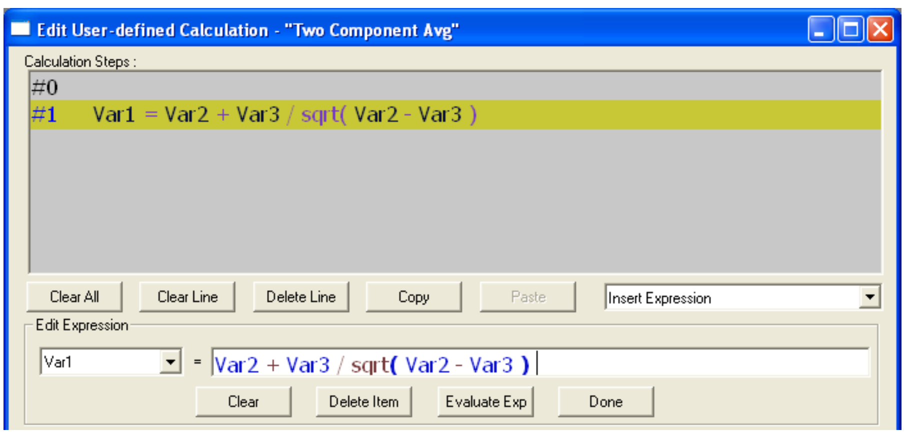
3. Add a regular expression. You can use constants, temporary variables, system variables, and the calculator functions to build the expression. For information on inserting system variables, see page E-16. For information on creating variables, see page E-15. For information on creating constants, see page E-14.

Figure E-17. The Edit Expression area



4. Click **Done**. MON 20/20 validates the statement and if there are no errors, it adds it to the **Calculation Steps Viewer**.

Figure E-18. The Calculation Steps Viewer

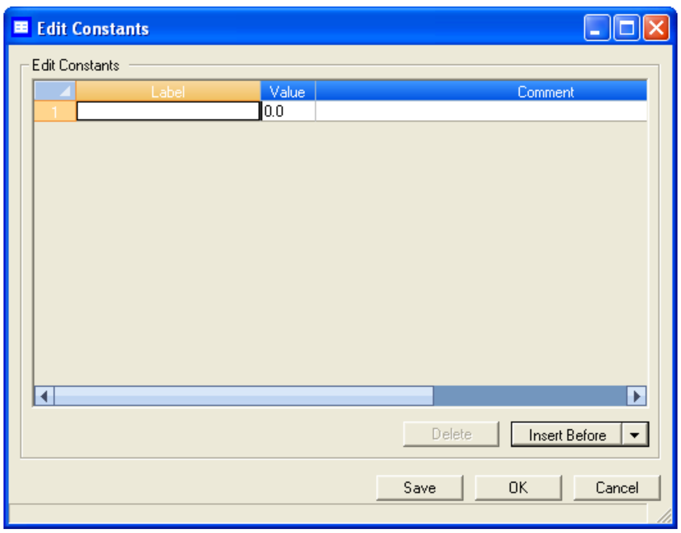


E.4 Creating a constant

To create a constant that you can use in building a calculation, do the following:

1. From the *Edit User-defined Calculation* window, click **Edit Constants**. The *Edit Constants* window displays, showing all the constants that have been created so far for the GC.

Figure E-19. The Edit Constants window



2. To create a new constant, click **Insert before**. A new row will be added to the *USER_CALC_CONSTANTS* table.

Note
To delete a constant, select it in the table and click Delete.

3. Double-click the *Label* cell and enter a name for the constant.

Note
To edit any cell, double-click it.

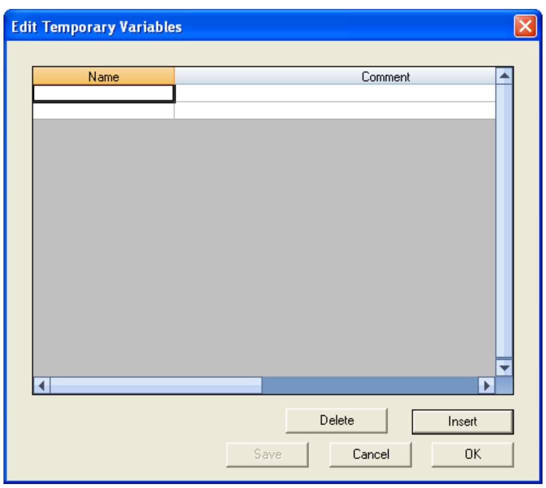
4. Double-click the *Value* cell and enter a value for the constant.
5. Use the *Comment* cell to store information that is relevant for the constant.
6. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

E.5 Creating or editing a temporary variable

To create a temporary variable that you can use in building a calculation, do the following:

1. From the *Edit User-defined Calculatio***n** window, click **Edit Temporary Variables**. The *Edit Temporary Variables* window displays, showing all the temporary variables that have been created so far for the user-defined calculation.

Figure E-20. The Edit Temporary Variables window



2. To create a new temporary variable, click **Insert**. A new row will be added to the table.

Note
To delete a variable from this window, select it in the table and click Delete.

3. Double-click the *Name* cell and enter a name for the variable.
4. Use the *Comment* cell to store information that is relevant for the variable.
5. To save the changes without closing the window, click **Save**. To save the changes and close the window, click **OK**.

E.6 Inserting a system variable

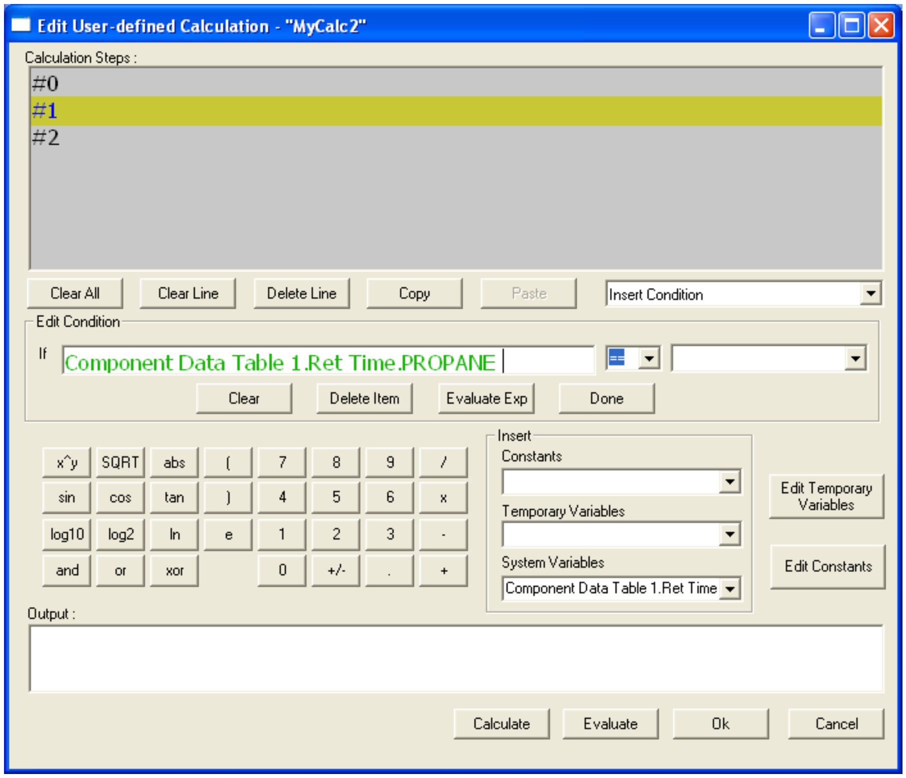
To insert a system variable into the Expression Editor, do the following:

From the *Edit User-defined Calculation* window, click on the *System Variables* drop-down arrow.

For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

The selected system variable displays in the *System Variables* drop-down box and in the **Expression Editor**.

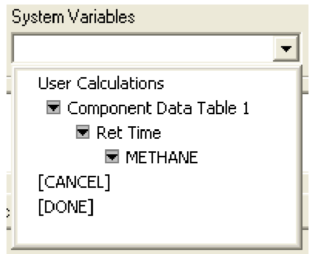
Figure E-21. The Expression Editor



E.7 Using user-defined calculations

You can use a previously-created user-defined calculation when building new calculations by clicking on the *System Variables* drop-down arrow on the *Edit User-defined Calculation* window.

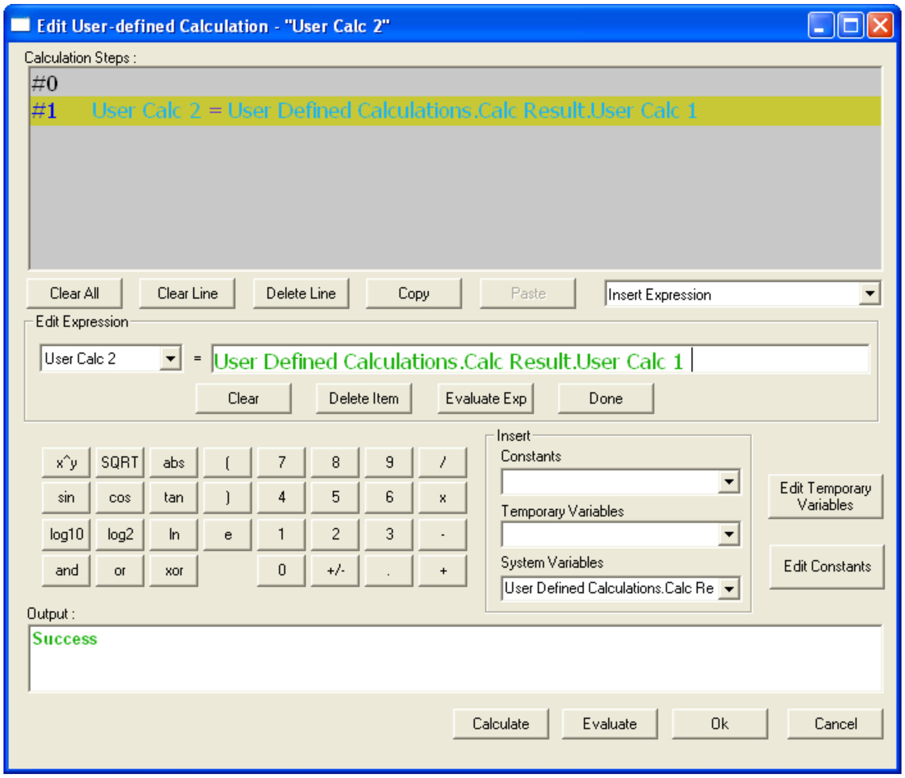
Figure E-22. System Variables drop-down menu



For a demonstration of how to use the context-sensitive variable selector, see "Using the context-sensitive variable selector" on page 1-42.

The selected system variable displays in the *System Variables* drop-down box and in the **Expression Editor**.

Figure E-23. The Expression Editor



WARRANTY CLAIM PROCEDURES

To make a warranty claim, you, the Purchaser, must:

1. Provide Daniel Measurement and Control, Inc. or Rosemount Analytical, Inc. with proof of the Date of Purchase and proof of the Date of Shipment of the product in question.
2. Return the product to Daniel Measurement Services (DMS) within 12 months of the date of original shipment of the product, or within 18 months of the date of original shipment of the product to destinations outside of the United States. The Purchaser must prepay any shipping charges. In addition, the Purchaser is responsible for insuring any product shipped for return, and assumes the risk of loss of the product during shipment.
3. To obtain warranty service or to locate the nearest DMS office, sales office, or service center, do one of the following:
   - Call (713) 827-6380
   - Fax a request to (713) 827-6312
   - Write to:

     Daniel Measurement Services
     11100 Brittmore Park Drive
     Houston, Texas 77041
   - Contact DMS via **www.emersonprocess.com/daniel**
4. When contacting DMS for product service, the Purchaser is asked to provide information as indicated on the following page entitled "Customer Repair Report".
5. For product returns from locations outside the United States, it will be necessary for you to obtain the import consignment address so that DMS's customs broker can handle the importation with the U.S. Customs Service.
6. DMS offers both on call and contract maintenance service designed to afford single source responsibility for all its products.
7. DMS reserves the right to make changes at any time to any product to improve its design and to insure the best available product.

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FOR SERVICE, COMPLETE THIS FORM, AND RETURN IT ALONG WITH THE AFFECTED EQUIPMENT TO CUSTOMER SERVICE AT THE ADDRESS INDICATED BELOW.

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TECHNICAL CONTACT: ______________________ PHONE: ______________

REPAIR P. O. #: ______________ IF WARRANTY, UNIT S/N: ________________

INVOICE ADDRESS: ____

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SHIPPING ADDRESS: ____

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RETURN SHIPPING METHOD: ______________________________________

EQUIPMENT MODEL #: ____________ S/N: ___________ FAILURE DATE: _________

DESCRIPTION OF PROBLEM: ______________________________________

____

____

WHAT WAS HAPPENING AT TIME OF FAILURE? ________________________

____

ADDITIONAL COMMENTS: ____

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REPORT PREPARED BY: ______________________ TITLE: ________________

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DIVISION OF EMERSON PROCESS MANAGEMENT
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